IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Jeff EDER

Serial No.: 09/688,983

Filed: October 17, 2000

For: AUTOMATED RISK TRANSFER SYSTEM

Group Art Unit: 3693

Examiner: H. Dass

Brief on Appeal

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20321

Sir:

This appeal brief is being submitted in response to the office action for the above referenced application mailed on January 3, 2007. The Table of Contents is on page 2 of this paper.

Table of Contents

Real party in interest

Asset Reliance, Inc. (dba Asset Trust, Inc.)

Related appeals

An appeal for U.S. Patent Application 10/329,172 filed December 23, 2002 may be affected by or have a bearing on this appeal. An appeal for U.S. Patent Application 09/761,671 filed January 18, 2001 may be affected or have a bearing on this appeal. An Appeal for U.S. Patent Application 09/940,450 filed on August 29, 2001 may be affected by or have a bearing on this appeal.

Status of Claims

Claims 157 - 181 and claims 201 - 213 are the subject of this appeal. No other claims are pending. Claims 1 - 156 have previously been cancelled without prejudice and claims 182 – 200 were previously withdrawn because of a restriction requirement.

Status of Amendments

An Supplemental Amendment was submitted on February 1, 2007 to correct a typo in one claim.

Summary of Claimed Subject Matter

One embodiment of an automated risk transfer system for a commercial enterprise according to the present invention is best depicted in Figure 1 – 15 of the specification. Figure 1 gives an overview of the major processing steps which include preparing data for use in analysis, analyzing the data to quantify value and risk for the enterprise, developing a risk reduction strategy and completing a series of activities that include the transfer of risk.

Independent claim 157 One embodiment of the automated risk transfer system for a commercial enterprise is exemplified in independent claim 157 where a computer readable media causes the processor in a computer to prepare data for use in analysis, analyze the data as required to quantify a plurality of risks, determine the amount capital available for risk management and identify one or more risk reduction activities before identifying a combination of risk management activities that will optimize one or more aspects of enterprise financial performance.

In the first step, data from a plurality of enterprise management systems are prepared for use in analysis by aggregating data from each system as described in FIG. 5A reference numbers 201 - 204, 207 - 209 and 211, FIG. 5B reference numbers 221 - 226, 209 and 211, FIG. 5C reference numbers 241 - 246, 209 and 211, FIG. 5D reference numbers 261 - 271, 209 and 211, FIG. 5E reference numbers 276 - 282, FIG. 5F reference numbers 291 - 297 and line 1, page 23, through line 35, page 49 of the specification (the System Setting/Databot section). As detailed in the specification and drawings, completion of the analysis and optimization requires at least four types of data:

1. Data that represent the aspects of enterprise financial performance being modeled – current operation by component of value, real options, contingent liabilities and market value;
2. Data that represents the elements of value in the enterprise;
3. Data that describes the risks facing the enterprise; and
4. Data that can be used to quantify market value factors that affect enterprise value.

Before data preparation can begin, the enterprise is defined using the system settings table and the time periods where data are required are determined as described in FIG. 5A reference number 202 and line 30, page 30, though line 19, page 32. The metadata mapping and conversion information that will be used to guide the extraction of data from each database is then established as described in FIG. 5A reference numbers 203 and line 21, page 32 through line 21, page 33 of the specification. The source(s) of data used to define and model each real option, component of value and market value factor are specified as part of this metadata mapping and conversion process.

After the metadata mapping and conversion information is established for each database, data from each database are extracted converted and stored in the application database. The extraction, conversion and storage of data from the basic financial system database is described in FIG 5A, reference number 207, 208, 209 and 211 and line 29, page 33 through line 5, page 35 of the specification. The extraction, conversion and storage of data from the operation management system database is described in FIG 5B, reference number 221, 222, 209 and 211 and line 12, page 35 through line 6, page 36 of the specification. The extraction, conversion and storage of data from the website transaction log database is described in FIG 5B, reference number 225, 209 and 211 and line 8, page 36 through line35, page 36 of the specification. The extraction, conversion and storage of data from human resource management system is described in FIG 5B,

reference number 226, 209 and 211 and line1, page 37 through line28, page 37 of the specification. The extraction, conversion and storage of data from external database(s) is described in FIG 5C, reference number 241, 242, 209 and 211 and line1, page 38 through line 28, page 38 of the specification. As described in line 30, page 27 through line 22, page 28 external databases are sources of information for: quantifying generic risks, pricing risk transfer products, pricing derivatives and developing market value factors. The extraction, conversion and storage of data from the advanced financial system database is described in FIG 5C, reference number 245, 209 and 211 and line 29, page 38 through line 21, page 39 of the specification. As discussed on line 18, page 20 through line 28, page 20, the advanced financial system database is the source of forecast information for the current operation components of value and the real option category of value. The extraction, conversion and storage of data from the soft asset management system database(s) is described in FIG 5C, reference number 246, 209 and 211 and line 23, page 39 through line 20, page 40 of the specification. The extraction, conversion and storage of data from the risk management system database is described in FIG 5D, reference number 261, 209 and 211 and line 22, page 40 through line 20, page 41 of the specification. It is well known to those of average skill in the art that risk management system databases generally contain information about the generic risks facing an enterprise as well as information about the prices associated with insurance products. The extraction, conversion and storage of data from the supply chain system database is described in FIG 5D, reference number 262, 209 and 211 and line 22, page 41 through line 20, page 40 of the specification. The extraction, conversion and storage of data from the internet is described in FIG 5D, reference number 266, 267, 268 and 269 and line 23, page 42 through line 8, page 44 of the specification. Text data and geospatial data may also be obtained from external databases. The stored data are then processed to identify and locate missing data, derive item performance indicators and derive market value factors as described in FIG. 5F reference number 292, 293, 294, 295 and 296 and line 25, page 47 through line 8, page 49 of the specification. Finally the sub-components of value are specified in accordance with procedure described in FIG. 5F reference number 298 and line 25, page 49 through line 35, page 49 of the specification.

The stored data are analyzed in order to determine the amount capital available for risk management, quantify a plurality of risks, and identify one or more risk management activities. The stored data can be used to identify the amount of capital available for investment in risk management using the method detailed in cross referenced U.S. Patent 5,615,109. More specifically, a method and system for identifying available capital under different scenarios is described in FIG. 7B reference number 443 and line 12, column 12 through line 10, column 93 of cross referenced U.S. Patent 5,615,109. Risks are identified from the stored data in two ways. First, contingent liability data are obtained from an advanced finance system as described in FIG 5C, reference number 245, 209 and 211; line 18, page 20 through line 28, page 20 and line 29, page 38 through line 21, page 39 of the specification. The value of the contingent liabilities are then calculated in accordance with the method described in line 1, page 66 through line 35, page 67 of the specification. Second, enterprise value is analyzed using the procedure described in FIG. 6A reference numbers 301 - 312, FIG. 6B reference numbers 321- 332, FIG. 6C reference numbers 341 - 353 and line 1, page 50 through line 35, page 78 of the specification as required to develop a model of enterprise value by category of value. As part of the enterprise value analysis process, the item variables, item performance indicators, composite variables and market value factors that are causal factors for stock price movement are identified as described in FIG 6A reference number 209 and line 1, page 59 through line 12, page 60 of the specification. The causal factors for stock price movement are analyzed to identify changes (aka risk management activities) that will reduce risk as described in FIG. 7 reference number 404 and line 12, page 80 through line 2, page 81 of the specification. The causal factors for stock price movement are then analyzed to identify their volatility under normal conditions as described in FIG. 7 reference number

403 and line 12, page 79 through line 11, page 80 of the specification and under extreme conditions as described in FIG. 7 reference number 405 and line 3, page 81 through line 35, page 81 of the specification. The causal factor volatility information is combined with the previously stored generic risk information to develop scenarios for quantifying enterprise risk as described in FIG. 7 reference number 409 and line 1, page 82 through line 35, page 82 of the specification.

In the next step, the scenarios are then combined with the previously developed model of enterprise financial performance by category of value as required to simulate enterprise financial performance as described in FIG. 7 reference number 410 and line 1, page 83 through line 2, page 84. In a manner that is well known by those of average skill in the art, risk by element and category of value are then calculated by comparing the values identified before the simulations to the values identified after each simulation. These values are then entered into a linear programming model to complete optimization calculations for value maximization or risk minimization analyses using the previously developed capital availability, risk transfer product and risk management activity information for each scenario as described in FIG. 7. reference number 411 and line 3, page 84 through line 27, page 84 of the specification. The multi criteria optimization that is mentioned in lines 14 - 15 of page 84 of the specification and described in column 68, lines 1 - 12 of cross-referenced U.S. Patent 5,615,109 is used to complete the combined value and risk optimization analysis.

Dependent claims

The limitations associated with dependent claim 158 are found in FIG. 7 reference number 409 and line 1, page 82 through line 35, page 82 of the specification.

The limitations associated with dependent claim 159 are found in a number of places including FIG. 6A reference numbers 301 - 312, FIG. 6B reference numbers 321- 332, FIG. 6C reference numbers 341 – 353, line 1, page 50 through line 35, page 78 and Table 2 page 10.

The limitations associated with dependent claim 160 are found in a number of places including FIG. 7 reference number 404 and 411, FIG. 8 reference number 502 and 514, line 12, page 80 through line 2, page 81 and line 3, page 84 through line 23, page 88 of the specification.

The limitations associated with dependent claim 161 are found in a number of places including FIG. 7 reference number 404, FIG. 8 reference number 502 and 514, line 22, page 24 through line 26, page 24, line 12, page 80 through line 2, page 81 and line 21, page 86 through line 23, page 88 of the specification.

The limitations associated with dependent claim 162 are found in a number of places including FIG. 8 reference number 514, Table 12, page 28 and line 25, page 87 through line 23, page 88 of the specification.

The limitations associated with dependent claim 163 are found in FIG. 6A reference numbers 301 - 312, FIG. 6B reference numbers 321- 332, FIG. 6C reference numbers 341 - 353 FIG. 7 reference numbers 403, 404, 405, 409 and 410 and line 1, page 50 through line 2, page 84 of the specification.

The limitations associated with dependent claim 164 are found in FIG. 6A reference numbers 301 - 312, FIG. 6B reference numbers 321- 332, FIG. 6C reference numbers 341 - 353 FIG. 7 reference numbers 403, 404, 405, 409 and 410 and line 1, page 50 through line 2, page 84 of the specification.

The limitations associated with dependent claim 165 are found in FIG. 6A reference numbers 301 - 312, FIG. 6B reference numbers 321- 332, FIG. 6C reference numbers 341 - 353 FIG. 7 reference numbers 403, 404, 405, 409 – 411, line 1, page 50 through line 27, page 84 of the specification and in lines 1 – 12 of column 68, of cross-referenced U.S. Patent 5,615,109.

The limitations associated with dependent claim 166 are found in FIG. 7. reference number 411; line 3, page 84 through line 27, page 84 of the specification and in lines 1 – 12 of column 68, of cross-referenced U.S. Patent 5,615,109.

The limitations associated with dependent claim 167 are found in properties of linear programs that are well known to those of average skill in the art.

The limitations associated with dependent claim 168 are found in FIG. 5A reference number 202 and 203 and line 30, page 30, though line 21, page 33 of the specification.

Independent Claim 169 A second embodiment of the automated risk transfer system for a commercial enterprise is exemplified in independent claim 169 where a computer system prepares data for use in analysis, analyze the data as required to quantify a plurality of risks, determine the amount capital available for risk management and identify one or more risk reduction activities before identifying a combination of risk management activities that will optimize one or more aspects of enterprise financial performance.

In the first step, data from a plurality of enterprise management systems are prepared for use in analysis by aggregating data from each system as described in FIG. 5A reference numbers 201 - 204, 207 - 209 and 211, FIG. 5B reference numbers 221 - 226, 209 and 211, FIG. 5C reference numbers 241 - 246, 209 and 211, FIG. 5D reference numbers 261 - 271, 209 and 211, FIG. 5E reference numbers 276 - 282, FIG. 5F reference numbers 291 - 297 and line 1, page 23, through line 35, page 49 of the specification (the System Setting/Databot section). As detailed in the specification and drawings, completion of the analysis and optimization requires at least four types of data:

1. Data that represent the aspects of enterprise financial performance being modeled – current operation by component of value, real options, contingent liabilities and market value;
2. Data that represents the elements of value in the enterprise;
3. Data that describes the risks facing the enterprise; and
4. Data that can be used to quantify market value factors that affect enterprise value.

Before data preparation can begin, the enterprise is defined using the system settings table and the time periods where data are required are determined as described in FIG. 5A reference number 202 and line 30, page 30, though line 19, page 32. The metadata mapping and conversion information that will be used to guide the extraction of data from each database is then established as described in FIG. 5A reference numbers 203 and line 21, page 32 through line 21, page 33 of the specification. The source(s) of data used to define and model each real option, component of value and market value factor are specified as part of this metadata mapping and conversion process.

After the metadata mapping and conversion information is established for each database, data from each database are extracted converted and stored in the application database. The extraction, conversion and storage of data from the basic financial system database is described in FIG 5A, reference number 207, 208, 209 and 211 and line 29, page 33 through line 5, page 35 of the specification. The extraction, conversion and storage of data from the operation management system database is described in FIG 5B, reference number 221, 222, 209 and 211 and line 12, page 35 through line 6, page 36 of the specification. The extraction, conversion and storage of data from the website transaction log database is described in FIG 5B, reference number 225, 209 and 211 and line 8, page 36 through line35, page 36 of the specification. The extraction, conversion and storage of data from human resource management system is described in FIG 5B, reference number 226, 209 and 211 and line1, page 37 through line28, page 37 of the specification. The extraction, conversion and storage of data from external database(s) is described in FIG 5C, reference number 241, 242, 209 and 211 and line1, page 38 through line 28, page 38 of the specification. As described in line 30, page 27 through line 22, page 28 external databases are sources of information for: quantifying generic risks, pricing risk transfer products, pricing derivatives and developing market value factors. The extraction, conversion and storage of data from the advanced financial system database is described in FIG 5C, reference number 245, 209 and 211 and line 29, page 38 through line 21, page 39 of the specification. As discussed on line 18, page 20 through line 28, page 20, the advanced financial system database is the source of forecast information for the current operation components of value and the real option category of value. The extraction, conversion and storage of data from the soft asset management system database(s) is described in FIG 5C, reference number 246, 209 and 211 and line 23, page 39 through line 20, page 40 of the specification. The extraction, conversion and storage of data from the risk management system database is described in FIG 5D, reference number 261, 209 and 211 and line 22, page 40 through line 20, page 41 of the specification. It is well known to those of average skill in the art that risk management system databases generally contain information about the generic risks facing an enterprise as well as information about the prices associated with insurance products. The extraction, conversion and storage of data from the supply chain system database is described in FIG 5D, reference number 262, 209 and 211 and line 22, page 41 through line 20, page 40 of the specification. The extraction, conversion and storage of data from the internet is described in FIG 5D, reference number 266, 267, 268 and 269 and line 23, page 42 through line 8, page 44 of the specification. Text data and geospatial data may also be obtained from external databases. The stored data are then processed to identify and locate missing data, derive item performance indicators and derive market value factors as described in FIG. 5F reference number 292, 293, 294, 295 and 296 and line 25, page 47 through line 8, page 49 of the specification. Finally the sub-components of value are specified in accordance with procedure described in FIG. 5F reference number 298 and line 25, page 49 through line 35, page 49 of the specification.

The stored data are analyzed in order to determine the amount capital available for risk management, quantify a plurality of risks, and identify one or more risk management activities. The stored data can be used to identify the amount of capital available for investment in risk management using the method detailed in cross referenced U.S. Patent 5,615,109. More specifically, a method and system for identifying available capital under different scenarios is described in FIG. 7B reference number 443 and line 12, column 12 through line 10, column 93 of cross referenced U.S. Patent 5,615,109. Risks are identified from the stored data in two ways. First, contingent liability data are obtained from an advanced finance system as described in FIG 5C, reference number 245, 209 and 211; line 18, page 20 through line 28, page 20 and line 29, page 38 through line 21, page 39 of the specification. The value of the contingent liabilities are then calculated in accordance with the method described in line 1, page 66 through line 35, page 67 of the specification. Second, enterprise value is analyzed using the procedure described in

FIG. 6A reference numbers 301 - 312, FIG. 6B reference numbers 321- 332, FIG. 6C reference numbers 341 - 353 and line 1, page 50 through line 35, page 78 of the specification as required to develop a model of enterprise value by category of value. As part of the enterprise value analysis process, the item variables, item performance indicators, composite variables and market value factors that are causal factors for stock price movement are identified as described in FIG 6A reference number 209 and line 1, page 59 through line 12, page 60 of the specification. The causal factors for stock price movement are analyzed to identify changes (aka risk management activities) that will reduce risk as described in FIG. 7 reference number 404 and line 12, page 80 through line 2, page 81 of the specification. The causal factors for stock price movement are then analyzed to identify their volatility under normal conditions as described in FIG. 7 reference number 403 and line 12, page 79 through line 11, page 80 of the specification and under extreme conditions as described in FIG. 7 reference number 405 and line 3, page 81 through line 35, page 81 of the specification. The causal factor volatility information is combined with the previously stored generic risk information to develop scenarios for quantifying enterprise risk as described in FIG. 7 reference number 409 and line 1, page 82 through line 35, page 82 of the specification.

In the next step, the scenarios are then combined with the previously developed model of enterprise financial performance by category of value as required to simulate enterprise financial performance as described in FIG. 7 reference number 410 and line 1, page 83 through line 2, page 84. In a manner that is well known by those of average skill in the art, risk by element and category of value are then calculated by comparing the values identified before the simulations to the values identified after each simulation. These values are then entered into a linear programming model to complete optimization calculations for value maximization or risk minimization analyses using the previously developed capital availability, risk transfer product and risk management activity information for each scenario as described in FIG. 7. reference number 411 and line 3, page 84 through line 27, page 84 of the specification. The multi criteria optimization that is mentioned in lines 14 - 15 of page 84 of the specification and described in column 68, lines 1 - 12 of cross-referenced U.S. Patent 5,615,109 is used to complete the combined value and risk optimization analysis.

Dependent claims

The limitations associated with dependent claim 170 are found in FIG. 7 reference number 409 and line 1, page 82 through line 35, page 82 of the specification.

The limitations associated with dependent claim 171 are found in a number of places including FIG. 6A reference numbers 301 - 312, FIG. 6B reference numbers 321- 332, FIG. 6C reference numbers 341 – 353, line 1, page 50 through line 35, page 78 and Table 2 page 10.

The limitations associated with dependent claim 172 are found in a number of places including FIG. 7 reference number 404 and 411, FIG. 8 reference number 502 and 514, line 12, page 80 through line 2, page 81 and line 3, page 84 through line 23, page 88 of the specification.

The limitations associated with dependent claim 173 are found in a number of places including FIG. 7 reference number 404, FIG. 8 reference number 502 and 514, line 22, page 24 through line 26, page 24, line 12, page 80 through line 2, page 81 and line 21, page 86 through line 23, page 88 of the specification.

The limitations associated with dependent claim 174 are found in a number of places including FIG. 8 reference number 514, Table 12, page 28 and line 25, page 87 through line 23, page 88 of the specification.

The limitations associated with dependent claim 175 are found in FIG. 6A reference numbers 301 - 312, FIG. 6B reference numbers 321- 332, FIG. 6C reference numbers 341 - 353 FIG. 7 reference numbers 403, 404, 405, 409 and 410 and line 1, page 50 through line 2, page 84 of the specification.

The limitations associated with dependent claim 176 are found in a number of places including line 15, page 54 through line 20, page 54 of the specification.

The limitations associated with dependent claim 177 are found in FIG. 6A reference numbers 301 - 312, FIG. 6B reference numbers 321- 332, FIG. 6C reference numbers 341 - 353 FIG. 7 reference numbers 403, 404, 405, 409 and 410 and line 1, page 50 through line 2, page 84 of the specification.

The limitations associated with dependent claim 178 are found in FIG. 6A reference numbers 301 - 312, FIG. 6B reference numbers 321- 332, FIG. 6C reference numbers 341 - 353 FIG. 7 reference numbers 403, 404, 405, 409 – 411, line 1, page 50 through line 27, page 84 of the specification and in lines 1 – 12 of column 68, of cross-referenced U.S. Patent 5,615,109.

The limitations associated with dependent claim 179 are found in FIG. 7. reference number 411; line 3, page 84 through line 27, page 84 of the specification and in lines 1 – 12 of column 68, of cross-referenced U.S. Patent 5,615,109.

The limitations associated with dependent claim 180 are found in properties of linear programs that are well known to those of average skill in the art.

The limitations associated with dependent claim 181 are found in FIG. 5A reference number 202 and 203 and line 30, page 30, though line 21, page 33 of the specification.

Independent Claim 201 A third embodiment of the automated risk transfer system for a commercial enterprise is exemplified in independent claim 201 where a process aggregates data for use in processing and then learns from the data as required to quantify a tangible impact for a plurality of risks and elements of value on the categories and components of value.

In the first step, data from a plurality of enterprise management systems are prepared for use in processing by aggregating data from each system as described in FIG. 5A reference numbers 201 - 204, 207 - 209 and 211, FIG. 5B reference numbers 221 - 226, 209 and 211, FIG. 5C reference numbers 241 - 246, 209 and 211, FIG. 5D reference numbers 261 - 271, 209 and 211, FIG. 5E reference numbers 276 - 282, FIG. 5F reference numbers 291 - 297 and line 1, page 23, through line 35, page 49 of the specification (the System Setting/Databot section). As detailed in the specification and drawings, completion of the analysis and optimization requires at least four types of data:

1. Data that represent the aspects of enterprise financial performance being modeled – current operation by component of value, real options, contingent liabilities and market value;
2. Data that represents the elements of value in the enterprise;
3. Data that describes the risks facing the enterprise; and

4. Data that can be used to quantify market value factors that affect enterprise value.

Before data preparation can begin, the enterprise is defined using the system settings table and the time periods where data are required are determined as described in FIG. 5A reference number 202 and line 30, page 30, though line 19, page 32. The metadata mapping and conversion information that will be used to guide the extraction of data from each database is then established as described in FIG. 5A reference numbers 203 and line 21, page 32 through line 21, page 33 of the specification. The source(s) of data used to define and model each real option, component of value and market value factor are specified as part of this metadata mapping and conversion process.

After the metadata mapping and conversion information is established for each database, data from each database are extracted converted and stored in the application database. The extraction, conversion and storage of data from the basic financial system database is described in FIG 5A, reference number 207, 208, 209 and 211 and line 29, page 33 through line 5, page 35 of the specification. The extraction, conversion and storage of data from the operation management system database is described in FIG 5B, reference number 221, 222, 209 and 211 and line 12, page 35 through line 6, page 36 of the specification. The extraction, conversion and storage of data from the website transaction log database is described in FIG 5B, reference number 225, 209 and 211 and line 8, page 36 through line35, page 36 of the specification. The extraction, conversion and storage of data from human resource management system is described in FIG 5B, reference number 226, 209 and 211 and line1, page 37 through line28, page 37 of the specification. The extraction, conversion and storage of data from external database(s) is described in FIG 5C, reference number 241, 242, 209 and 211 and line1, page 38 through line 28, page 38 of the specification. As described in line 30, page 27 through line 22, page 28 external databases are sources of information for: quantifying generic risks, pricing risk transfer products, pricing derivatives and developing market value factors. The extraction, conversion and storage of data from the advanced financial system database is described in FIG 5C, reference number 245, 209 and 211 and line 29, page 38 through line 21, page 39 of the specification. As discussed on line 18, page 20 through line 28, page 20, the advanced financial system database is the source of forecast information for the current operation components of value and the real option category of value. The extraction, conversion and storage of data from the soft asset management system database(s) is described in FIG 5C, reference number 246, 209 and 211 and line 23, page 39 through line 20, page 40 of the specification. The extraction, conversion and storage of data from the risk management system database is described in FIG 5D, reference number 261, 209 and 211 and line 22, page 40 through line 20, page 41 of the specification. It is well known to those of average skill in the art that risk management system databases generally contain information about the generic risks facing an enterprise as well as information about the prices associated with insurance products. The extraction, conversion and storage of data from the supply chain system database is described in FIG 5D, reference number 262, 209 and 211 and line 22, page 41 through line 20, page 40 of the specification. The extraction, conversion and storage of data from the internet is described in FIG 5D, reference number 266, 267, 268 and 269 and line 23, page 42 through line 8, page 44 of the specification. Text data and geospatial data may also be obtained from external databases. The stored data are then processed to identify and locate missing data, derive item performance indicators and derive market value factors as described in FIG. 5F reference number 292, 293, 294, 295 and 296 and line 25, page 47 through line 8, page 49 of the specification. Finally the sub-components of value are specified in accordance with procedure described in FIG. 5F reference number 298 and line 25, page 49 through line 35, page 49 of the specification.

The stored data are analyzed in order to quantify the impact of a plurality of elements of value and risks on the categories and components of value. The impact of elements of value on

the categories and components of enterprise value is analyzed using the procedure described in FIG. 6A reference numbers 301 - 312, FIG. 6B reference numbers 321- 332, FIG. 6C reference numbers 341 - 353 and line 1, page 50 through line 35, page 78 of the specification. Item performance indicators created in the prior stage of processing are used to develop a model of element of value impact on each of the components of current operation value (revenue, expense or capital change) as described in FIG. 6A reference numbers 301 – 312 and in line 1, page 51 through line 12, page 60 of the specification. As part of this process, the item variables, item performance indicators, composite variables and market value factors that are causal factors for stock price movement are identified as described in FIG 6A reference number 209 and line 1, page 59 through line 12, page 60 of the specification. After this analysis is completed, the next step is processing is developing a model of the impact of elements of value on enterprise real option values. In the first model development step, the relative strength (or rank) of the causal factors vis a vis competitors is assessed using DEA analysis. The results of this assessment are then used to calculate a real option discount rate in accordance with the method illustrated in Table 32 on page 67. The real option discount rate is then used to value the real options and identify the contribution of each element of value to each real option value using the information on revenue, expense and capital change previously extracted from the advance finance system table. This portion of the processing is described in FIG. 6B reference numbers 321- 332 and line 15, page 60 through line 20, page 68 of the specification. Finally, a model of the impact of elements of value on enterprise market sentiment value is developed by combining the results of the prior analyses in accordance with the equation shown in Table 43. The causal factors for stock price movement are then used to identify the expected contribution of each element of value to market value. This contribution is compared to the calculated contribution of each element of value to enterprise current operation value and enterprise real option value in order to identify a market sentiment value by element of value as shown in Table 45 on page 78. This portion of the processing is described in FIG. 6C reference numbers 341 - 353 and line 3, page 69 through line 35, page 78 of the specification.

The impact of risks are identified from the stored data in two ways. First, contingent liability data are obtained from an advanced finance system as described in FIG 5C, reference number 245, 209 and 211; line 18, page 20 through line 28, page 20 and line 29, page 38 through line 21, page 39 of the specification. The value of the contingent liabilities are then calculated in accordance with the method described in line 1, page 66 through line 35, page 67 of the specification. Second, the causal factors for stock price movement are then analyzed to identify their volatility under normal conditions as described in FIG. 7 reference number 403 and line 12, page 79 through line 11, page 80 of the specification and under extreme conditions as described in FIG. 7 reference number 405 and line 3, page 81 through line 35, page 81 of the specification. The causal factor volatility information is combined with the previously stored generic risk information to develop scenarios for quantifying enterprise risk as described in FIG. 7 reference number 409 and line 1, page 82 through line 35, page 82 of the specification. The scenarios are then combined with the previously developed model of enterprise financial performance by category of value as required to simulate enterprise financial performance as described in FIG. 7 reference number 410 and line 1, page 83 through line 2, page 84. In a manner that is well known to those of average skill in the art, risk by element of value, category of value and component of value are then calculated by comparing the values identified before the simulations to the values identified after each simulation.

Dependent claims

The limitations associated with dependent claim 202 are found in FIG. 7 reference number 404 and 411, line 12, page 80 through line 2, page 81, line 3, page 84 through line 27, page 84 of the specification and FIG. 7B reference number 443 and line 12, column 12 through line 10, column 93 of cross referenced U.S. Patent 5,615,109

The limitations associated with dependent claim 203 are found in FIG. 5A reference number 202 and 203 and line 30, page 30, though line 21, page 33 of the specification.

The limitations associated with dependent claim 204 are found in are found in a number of places including FIG. 6A reference numbers 301 - 312, FIG. 6B reference numbers 321- 332, FIG. 6C reference numbers 341 – 353, line 1, page 50 through line 35, page 78 and Table 2 page 10.

The limitations associated with dependent claim 205 are found in FIG. 7 reference number 409 and line 1, page 82 through line 35, page 82 of the specification.

The limitations associated with dependent claim 206 are found in a number of places including FIG. 7 reference number 404 and 411, FIG. 8 reference number 502 and 514, line 12, page 80 through line 2, page 81 and line 3, page 84 through line 23, page 88 of the specification.

Independent Claim 207 A fourth embodiment of the automated risk transfer system for a commercial enterprise is exemplified in independent claim 207 where a process aggregates data for use in processing and then analyzes the data as required to quantify an enterprise value and risk by category of value, component of value and element of value.

In the first step, data from a plurality of enterprise management systems are prepared for use in processing by aggregating data from each system as described in FIG. 5A reference numbers 201 - 204, 207 - 209 and 211, FIG. 5B reference numbers 221 - 226, 209 and 211, FIG. 5C reference numbers 241 - 246, 209 and 211, FIG. 5D reference numbers 261 - 271, 209 and 211, FIG. 5E reference numbers 276 - 282, FIG. 5F reference numbers 291 - 297 and line 1, page 23, through line 35, page 49 of the specification (the System Setting/Databot section). As detailed in the specification and drawings, completion of the analysis and optimization requires at least four types of data:

1. Data that represent the aspects of enterprise financial performance being modeled – current operation by component of value, real options, contingent liabilities and market value;
2. Data that represents the elements of value in the enterprise;
3. Data that describes the risks facing the enterprise; and
4. Data that can be used to quantify market value factors that affect enterprise value.

Before data preparation can begin, the enterprise is defined using the system settings table and the time periods where data are required are determined as described in FIG. 5A reference number 202 and line 30, page 30, though line 19, page 32. The metadata mapping and conversion information that will be used to guide the extraction of data from each database is then established as described in FIG. 5A reference numbers 203 and line 21, page 32 through line 21, page 33 of the specification. The source(s) of data used to define and model each real option, component of value and market value factor are specified as part of this metadata mapping and conversion process.

After the metadata mapping and conversion information is established for each database, data from each database are extracted converted and stored in the application database. The extraction, conversion and storage of data from the basic financial system database is described in FIG 5A, reference number 207, 208, 209 and 211 and line 29, page 33 through line 5, page 35 of

the specification. The extraction, conversion and storage of data from the operation management system database is described in FIG 5B, reference number 221, 222, 209 and 211 and line 12, page 35 through line 6, page 36 of the specification. The extraction, conversion and storage of data from the website transaction log database is described in FIG 5B, reference number 225, 209 and 211 and line 8, page 36 through line35, page 36 of the specification. The extraction, conversion and storage of data from human resource management system is described in FIG 5B, reference number 226, 209 and 211 and line1, page 37 through line28, page 37 of the specification. The extraction, conversion and storage of data from external database(s) is described in FIG 5C, reference number 241, 242, 209 and 211 and line1, page 38 through line 28, page 38 of the specification. As described in line 30, page 27 through line 22, page 28 external databases are sources of information for: quantifying generic risks, pricing risk transfer products, pricing derivatives and developing market value factors. The extraction, conversion and storage of data from the advanced financial system database is described in FIG 5C, reference number 245, 209 and 211 and line 29, page 38 through line 21, page 39 of the specification. As discussed on line 18, page 20 through line 28, page 20, the advanced financial system database is the source of forecast information for the current operation components of value and the real option category of value. The extraction, conversion and storage of data from the soft asset management system database(s) is described in FIG 5C, reference number 246, 209 and 211 and line 23, page 39 through line 20, page 40 of the specification. The extraction, conversion and storage of data from the risk management system database is described in FIG 5D, reference number 261, 209 and 211 and line 22, page 40 through line 20, page 41 of the specification. It is well known to those of average skill in the art that risk management system databases generally contain information about the generic risks facing an enterprise as well as information about the prices associated with insurance products. The extraction, conversion and storage of data from the supply chain system database is described in FIG 5D, reference number 262, 209 and 211 and line 22, page 41 through line 20, page 40 of the specification. The extraction, conversion and storage of data from the internet is described in FIG 5D, reference number 266, 267, 268 and 269 and line 23, page 42 through line 8, page 44 of the specification. Text data and geospatial data may also be obtained from external databases. The stored data are then processed to identify and locate missing data, derive item performance indicators and derive market value factors as described in FIG. 5F reference number 292, 293, 294, 295 and 296 and line 25, page 47 through line 8, page 49 of the specification. Finally the sub-components of value are specified in accordance with procedure described in FIG. 5F reference number 298 and line 25, page 49 through line 35, page 49 of the specification.

The stored data are analyzed in order to quantify value and risk by category of value, component of value and element of value. The impact of elements of value on the categories and components of enterprise value is analyzed using the procedure described in FIG. 6A reference numbers 301 - 312, FIG. 6B reference numbers 321- 332, FIG. 6C reference numbers 341 - 353 and line 1, page 50 through line 35, page 78 of the specification. Item performance indicators created in the prior stage of processing are used to develop a model of element of value impact on each of the components of current operation value (revenue, expense or capital change) as described in FIG. 6A reference numbers 301 – 312 and in line 1, page 51 through line 12, page 60 of the specification. As part of this process, the item variables, item performance indicators, composite variables and market value factors that are causal factors for stock price movement are identified as described in FIG 6A reference number 209 and line 1, page 59 through line 12, page 60 of the specification. After this analysis is completed, the next step is processing is developing a model of the impact of elements of value on enterprise real option values. In the first model development step, the relative strength (or rank) of the causal factors vis a vis competitors is assessed using DEA analysis. The results of this assessment are then used to calculate a real option discount rate in accordance with the method illustrated in Table 32 on page 67. The real

option discount rate is then used to value the real options and identify the contribution of each element of value to each real option value using the information on revenue, expense and capital change previously extracted from the advance finance system table. This portion of the processing is described in FIG. 6B reference numbers 321- 332 and line 15, page 60 through line 20, page 68 of the specification. Finally, a model of the impact of elements of value on enterprise market sentiment value is developed by combining the results of the prior analyses in accordance with the equation shown in Table 43. The causal factors for stock price movement are then used to identify the expected contribution of each element of value to market value. This contribution is compared to the calculated contribution of each element of value to enterprise current operation value and enterprise real option value in order to identify a market sentiment value by element of value as shown in Table 45 on page 78. This portion of the processing is described in FIG. 6C reference numbers 341 - 353 and line 3, page 69 through line 35, page 78 of the specification.

Risks are quantified from the stored data in two ways. First, contingent liability data are obtained from an advanced finance system as described in FIG 5C, reference number 245, 209 and 211; line 18, page 20 through line 28, page 20 and line 29, page 38 through line 21, page 39 of the specification. The value of the contingent liabilities are then calculated in accordance with the method described in line 1, page 66 through line 35, page 67 of the specification. Second, the causal factors for stock price movement are then analyzed to identify their volatility under normal conditions as described in FIG. 7 reference number 403 and line 12, page 79 through line 11, page 80 of the specification and under extreme conditions as described in FIG. 7 reference number 405 and line 3, page 81 through line 35, page 81 of the specification. The causal factor volatility information is combined with the previously stored generic risk information to develop scenarios for quantifying enterprise risk as described in FIG. 7 reference number 409 and line 1, page 82 through line 35, page 82 of the specification. The scenarios are then combined with the previously developed model of enterprise financial performance by element and category of value as required to simulate enterprise financial performance as described in FIG. 7 reference number 410 and line 1, page 83 through line 2, page 84. Risk by element of value, category of value and component of value for each scenario are easily calculated by comparing the values identified before the simulations to the values identified after each simulation.

Dependent claims

The limitations associated with dependent claim 208 are found in FIG. 5A reference number 202 and 203 and line 30, page 30, though line 21, page 33 of the specification.

The limitations associated with dependent claim 209 are found in FIG. 7 reference number 404 and 411, line 12, page 80 through line 2, page 81, line 3, page 84 through line 27, page 84 of the specification and FIG. 7B reference number 443 and line 12, column 12 through line 10, column 93 of cross referenced U.S. Patent 5,615,109

The limitations associated with dependent claim 210 are found in FIG. 7 reference number 409 and line 1, page 82 through line 35, page 82 of the specification.

The limitations associated with dependent claim 211 are found in are found in a number of places including FIG. 6A reference numbers 301 - 312, FIG. 6B reference numbers 321- 332, FIG. 6C reference numbers 341 – 353, line 1, page 50 through line 35, page 78 and Table 2 page 10.

The limitations associated with dependent claim 212 are found in a number of places including FIG. 7 reference number 404 and 411, FIG. 8 reference number 502 and 514, line 12, page 80 through line 2, page 81 and line 3, page 84 through line 23, page 88 of the specification.

The limitations associated with dependent claim 213 are found in a number of places including FIG. 8 reference number 514, Table 12, page 28 and line 25, page 87 through line 23, page 88 of the specification.

Grounds of rejection to be reviewed on appeal

Issue 1 - Whether claims 157, 159 – 163, 165 – 167, 169, 171 – 176 and 178 – 180 are patentable under 35 USC 103 over Baseman (U.S. Patent 6,671,673) and Tamayo (U.S. Patent 6,836,773)?

Issue 2 - Whether claims 158, 164, 170 and 177 are patentable under 35 USC 103 over Baseman (U.S. Patent 6,671,673) and Tamayo (U.S. Patent 6,836,773) in view of Packwood (U.S. Patent 7,006,992)?

Issue 3 - Whether claims 168, 181, 203, 206 and 208 are patentable under 35 USC 103 over Baseman (U.S. Patent 6,671,673) and Tamayo (U.S. Patent 6,836,773) in view of Ranger (U.S. Patent 7,006,992)?

Issue 4 - Whether claims 201, 202, 204, 207, 209 and 211 are patentable under 35 USC 103 over Baseman (U.S. Patent 6,671,673) and Tamayo (U.S. Patent 6,836,773) in view of Ching (U.S. Patent 6,078,901) and claims 205 and 210 are patentable under 35 USC 103 in view of Baseman, Tamayo, Ching and Packwood?

Issue 5 - Whether claim 157, claim 158, claim 159, claim 160, claim 161, claim 162, claim 163, claim 164, claim 165, claim 166, claim 167, claim 168, claim 169, claim 170, claim 171, claim 172, claim 173, claim 174, claim 175, claim 176, claim 177, claim 178, claim 179, claim 180 and/or claim 181 are enabled under 35 USC 112, first paragraph?

Issue 6 – Whether claim 201, claim 202, claim 203, claim 204, claim 205, claim 206, claim 207, claim 208, claim 209, claim 210, claim 211, claim 212 and/or claim 213 are enabled under 35 USC 112, first paragraph?

Issue 7 - Whether the invention described in claims 157 - 168 represents patentable subject matter under 35 USC 101?

Issue 8 - Whether the invention described in claims 169 - 181 represents patentable subject matter under 35 USC 101?

Issue 9 - Whether the invention described in claims 201 - 206 represents patentable subject matter under 35 USC 101?

Issue 10 - Whether the invention described in claims 207 - 213 represents patentable subject matter under 35 USC 101?

Issue 11 – Whether pending claim 211 is unpatentable under the statutory double patenting prohibition given pending claim 204?

Issue 12 – Other informality considerations

The Argument

Grouping of Claims

For each ground of rejection which Appellant contests herein which applies to more than one claim, such additional claims, to the extent separately identified and argued below, do not stand and fall together.

Issue 1 - Whether claims 157, 159 – 163, 165 – 167, 169, 171 – 176 and 178 – 180 are patentable under 35 USC 103 over Baseman (U.S. Patent 6,671,673) and Tamayo (U.S. Patent 6,836,773)

The claims are patentable because the claims describe an invention that produces results that are concrete, tangible and useful. Other reasons the claims are patentable include the fact that the arguments used to support the rejection of claims 157, 159 – 163, 165 – 167, 169, 171 – 176 and 178 – 180 fails to establish a prima facie case because:

1. The cited combination of documents (Baseman and Tamayo) teaches away from the proposed combination;
2. The cited combination of documents (Baseman and Tamayo) requires a change in the principles governing the operation of the methods disclosed by the cited documents;
3. The cited combination of documents (Baseman and Tamayo) fails to meet any of the criteria for establishing a prima facie case of obviousness; and
4. The cited combination of documents (Baseman and Tamayo) fails to make the invention as a whole obvious.

The first reason the claims are allowable is that the cited combination of documents used to support the rejections of claim 157, 159 – 163, 165 – 167, 169, 171 – 176 and 178 – 180 teach away from the proposed combination. MPEP § 2145 X.D.2 provides that: "*it is improper to combine references where the references teach away from their combination.*" The cited combination of documents teaches away from the proposed combination in a number of ways as detailed below:

1. Incompatible assumptions. Baseman teaches a method for developing an optimization plan for enterprise profit that relies on the assumption that optimized results can be obtained after making changes to the enterprise supply chain and related variables (see Page 53 and 55, Evidence Appendix Baseman, abstract, C7, L60 - C8, L3). Tamayo teaches a method for improving web site visitor experience that relies exclusively on analyzing internet visitor data (see Page 58, Evidence Appendix Tamayo, C4, L36 - 42). In short, Baseman teaches and relies on the assumption that the data analysis taught by Tamayo is not useful for developing an optimization plan for an enterprise. As a result, the two documents teach away from their own combination.

2. Incompatible data analysis methods. Baseman teaches and relies on the subjective determination of causal relationships between variables (see Page 56, Evidence Appendix Baseman, C23, L5 - 8) while Tamayo teaches the use of data mining algorithms for classification and association (see Page 59, Evidence Appendix Tamayo C17, L62 - 65). Because the documents teach incompatible methods for performing data analysis, the two documents teach away from their own combination.

3. Incompatible focus. Baseman teaches a method for developing an optimization plan for enterprise profit (and value) in the future (see Page 53 and 55, Evidence Appendix Baseman, abstract, C8, L 1 - 3). Tamayo teaches a method for the near real time improvement of the web site experience for current visitors (see Page 59, Evidence Appendix Tamayo C17, L62 - 65).

Because the focus of the Baseman method for developing a plan for future enterprise optimization is not relevant to the focus on real time improvement for web site visitors taught by Tamayo, the two documents teach away from their own combination.

The second reason that the cited combination of documents fails to establish a prima facie case of obviousness for claims 157, 159 – 163, 165 – 167, 169, 171 – 176 and 178 – 180 is that the proposed combination of documents would change the principle of operation of each of the cited inventions. MPEP 2143.01 provides that when "*the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious. In re Ratti, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)*". As noted previously, the obviousness rejections for these claims are based on a combination of Baseman and Tamayo. Some of the changes in operating principles required to make the combination function are discussed below:

1. Baseman teaches and relies on the principle that the maximizing the short term profit of a commercial enterprise is equivalent to maximizing enterprise value (see Page 53 and 55, Evidence Appendix Baseman, abstract, C8, L 1 - 3). The Examiner has proposed combining Baseman and Tamayo to render obvious an invention for determining a combination of risk management activities that optimizes enterprise market value and/or risk. The Appellant respectfully submits that this would only be possible if the principle of operation of the Baseman invention were changed to:

a) Enable the optimization of enterprise market value by optimizing <u>all</u> the categories of value typically found in a commercial enterprise (current operation, real option and market sentiment) – not just short term profit; and

b) Enable the optimization of enterprise risk and the combination of enterprise market value and enterprise risk (note: Baseman teaches value at risk methods which cannot be used to support optimization see pages 63 – 65, Evidence Appendix).

Because several changes in the principle of the operation of Baseman would be required to enable the cited combination to replicate even a portion of the functionality of the claimed invention, the teachings of the documents are not sufficient to render the claims prima facie obvious.

2. Baseman teaches and relies on the principle that risk management improves enterprise value by reducing the cost of capital (see Page 54, Evidence Appendix Baseman, C6, L 28 - 32). The exact manner in which this is accomplished is not explained. The Examiner has proposed combining Baseman and Tamayo to render obvious an invention for determining a combination of risk management activities that optimizes enterprise market value and/or risk. The Appellant respectfully submits that this would only be possible if the principle of operation of the Baseman invention were changed to recognize the fact that risk management activities can improve value by increasing expected cash flow, real option value and/or market sentiment – not just by reducing the cost of capital in some undefined manner.

3. Tamayo teaches and relies on the principle that a single analysis step can be used to identify associations and/or relationships and that the algorithm for this step can be specified in advance (see pages 58 - 59, Evidence Appendix Tamayo, C4, L36 – 46 and C17, L 54 - 55). The Examiner has proposed combining Baseman and Tamayo to render obvious an invention for determining a combination of risk management activities that optimizes enterprise value and/or risk that is supported by model selection learned from the data. The Appellant respectfully submits that this would only be possible if the principle of operation of the Tamayo invention were changed to allow for the selection of models based on results learned from the data. Because a change in the principle of the operation of Tamayo are

required to enable the cited combination to replicate the functionality of the claimed invention, the teachings of the documents are not sufficient to render the claims prima facie obvious.

4. Baseman teaches and relies on the assumption that short term profit and long term value can be optimized by making changes to the supply chain element of value and financial management variables that are related to supply chain activity (see Page 53 and 55, Evidence Appendix Baseman, abstract, C8, L 1 - 3). The Examiner has proposed combining Baseman and Tamayo to render obvious an invention for determining a combination of risk management activities associated with all the elements of value that optimizes enterprise market value and/or risk. The Appellant respectfully submits that this would only be possible if the principle of operation of the Baseman invention were changed to consider the benefits and risks associated with changes to all the elements of value that have an effect on corporate performance as part of any optimization analysis. Because a change in the principle of the operation of Baseman would be required to enable the cited combination to replicate even a portion of the functionality of the claimed invention, the teachings of the documents are not sufficient to render the claims prima facie obvious.

The Appellant notes that there are still other changes in the principle of operation of the inventions described by the two cited documents that would be required to replicate the claimed invention.

The third reason the claims are allowable is that the cited combination of documents fails to establish the prima facie case of obviousness by failing to meet any of the criteria required for establishing a prima facie case of obviousness. MPEP 2142 provides that: "*in order to establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.*" As detailed below, the cited combination fails to meet all three criteria for establishing a prima facie case of obviousness required to sustain the rejection of claims 157, 159 – 163, 165 – 167, 169, 171 – 176 and 178 – 180.

1. The cited combination does not provide any evidence indicating that there was any suggestion, teaching or motivation in the prior art to modify or combine the teachings of Baseman and Tamayo. This is particularly true since the combination suggested, but not described in the 3 January 2007 Office Action, would not be expected to make either method alone or in combination stronger, cheaper, cleaner, faster, lighter, smaller, more durable, more accurate, more effective and/or more efficient.

2. The cited combination does not cite a combination of teachings that has a reasonable expectation of success. Reasons the cited combination of documents would be expected to fail include the cited combination could not be expected to optimize risk transfer under any circumstance because the VaR Metric Baseman apparently relies on (see Page 57, Evidence Appendix Baseman, C28, L23) is a backward looking metric that cannot be used to support optimization. It is well known that optimization analyses require the systematic review of tradeoffs among different alternatives for future development (see pages 63 – 65, Evidence Appendix). Furthermore, the Examiner has been unable to explain how the teachings of the two documents would be combined to produce anything useful.

3. The cited combination does not teach or suggest one or more of the claim limitations for each of the claims. For example, the cited combination does not identify a method for value measurement, risk management, risk optimization, risk transfer analysis and/or for risk transfer optimization.

The fourth reason the claims 157, 159 – 163, 165 – 167, 169, 171 – 176 and 178 – 180 are patentable is because the combination of documents fails to make the invention as a whole obvious as required by MPEP § 2141.02. MPEP § 2141.02 states that: "*in determining the difference between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious but whether the claimed invention as a whole would have been obvious.*" As noted previously, the obviousness rejections are based on a combination of Baseman and Tamayo. Baseman and Tamayo each teach away from the method of the instant application in a number of ways including:

1. teaching that risk management improves value by reducing the cost of capital;
2. teaching that that a plan for short term profit and value optimization of an enterprise can be developed by considering changes related to a single element of value – the supply chain;
3. teaching away from the use of learning for data mining model selection; and
4. teaching reliance on the VaR metric.

As noted previously, the two documents also teach away from their own combination. Furthermore, the Examiner has failed to identify reasons for combining the teachings of the two documents and he has also failed to explain how the teachings of the two inventions could be combined to produce anything useful. Taken together the cited combination of documents fails to make the invention as a whole obvious. The cited combination also fails to make a single aspect of the claimed invention obvious. These failures provide additional evidence that the claimed invention for producing concrete, tangible and useful results is new, novel and non-obvious. The Appellant notes that there are still other ways in the cited combination can be shown to have failed to establish a prima facie case of obviousness including the fact that the combination is not enabling.

Finally, as noted previously, a fifth reason claims 157, 159 – 163, 165 – 167, 169, 171 – 176 and 178 – 180 are allowable is that the claimed invention produces results that are concrete, tangible and useful. Furthermore, these results meet a long felt need for improved capabilities to analyze and manage the elements of value and risks that drive the financial performance of a commercial enterprise.

The Appellant notes that Baseman and Tamayo is thirteenth consecutive improper patent combination proposed by the Examiner for the instant application and/or for a related application (10/329,172). The thirteen combinations have each failed to establish a prima facie case of obviousness for a single claim. This is also the thirteenth patent combination in a row where the Examiner has been unable to explain how the teachings from the different patents should be combined to produce anything useful. It is well established that "*particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed" (In re Kotzab, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000))*. In spite of this well know requirement, none of the thirteen combinations have included any information about how the teachings of these cited documents could be combined or the reason for doing so. The Appellant also notes that this is also the twenty-third consecutive office action prepared by Examiners in TC 3600 that contains one or more improper combination of patents and that each of these twenty three office actions have also failed to establish a prima facie case of obviousness for a single claim. The Supervising Examiners authorization of the 3 January 2007 Office Action for the instant application with five improper combinations adds to the substantial body of evidence that the lack of the requisite skill in the art includes personnel at all levels of Technology Center 3600.

Issue 2 - Whether claims 158, 164, 170 and 177 are patentable under 35 USC 103 over Baseman (U.S. Patent 6,671,673) and Tamayo (U.S. Patent 6,836,773) in view of Packwood (U.S. Patent 7,006,992)?

The claims are patentable in view of the shortcomings in the arguments contained in the 3 January 2007 Office Action that were detailed in issue 1 and the usefulness of the results produced by the claimed invention. In particular, claims 158, 164, 170 and 177 are allowable for the first, second, third, fourth and fifth reasons advanced under Issue 1.

A sixth reason that claims 158, 164, 170 and 177 are patentable is that the assertions regarding the alleged obviousness of the claims are not in compliance with the requirements of the Administrative Procedures Act and are therefore moot. The APA provides two standards for review – an arbitrary and capricious standard and a substantial evidence standard. The Appellant respectfully submits that the 3 January 2007 Office Action fails to meet both standards. As discussed previously, the 3 January 2007 Office Action fails under the substantial evidence standard because it fails to provide prima facie case of obviousness that would support the rejection of a single claim. The Appellant also respectfully submits that a review of the prosecution history of this application and related applications makes it clear that any reliance on the obviousness rejections contained in the 3 January 2007 Office Action would also fail under the second standard of the APA – the arbitrary and capricious standard. Under that standard, the reviewing court analyzes whether a rational connection exists between the agency's factfindings and its ultimate action. The reasons the obviousness rejections contained in the 3 January 2007 Office Action for these claims would fail under the arbitrary and capricious standard is that the agency's factfindings have already identified twelve improper combinations of patents for the pending claims and/or similar claims. Given these well documented failures, presenting an argument that a 13th combination, 14th combination, etc. is obvious is not rational or reasonable. Given the agency's prior factfindings, the decision to issue obviousness rejections for these claims also fails under the arbitrary and capricious standard.

The Appellant notes that Baseman, Tamayo and Packwood is the fourteenth consecutive improper patent combination proposed by the Examiner for this or similar subject matter and that these fourteen combinations have each failed to establish a prima facie case of obviousness for a single claim. This is also the fourteenth patent combination in a row where the Examiner has been unable to explain how the teachings of the different patents should be combined to produce anything useful.

Issue 3 - Whether claims 168, 181, 203, 206 and 208 are patentable under 35 USC 103 over Baseman (U.S. Patent 6,671,673) and Tamayo (U.S. Patent 6,836,773) in view of Ranger (U.S. Patent 6,301,584)?

The claims are patentable in view of the shortcomings in the arguments contained in the 3 January 2007 Office Action that were detailed in issue 1 and the usefulness of the results produced by the claimed invention. In particular, claims 168, 181, 203, 206 and 208 are allowable for the first, second, third, fourth and fifth reasons advanced under Issue 1.

A sixth reason the claims are patentable is that Ranger teaches away from a combination with Tamayo. The Ranger method invokes agents to gather data on a one at a time basis in response to a query, post the results of their data gathering on to a common "blackboard" before integrating the data into one or more entities (see pages 60, Evidence Appendix, Ranger, C18, L33 - 42). This time consuming process teaches away from a combination with Tamayo which teaches the use of click-stream data - a function that requires near real time data integration and analysis (see

pages 58 & 59, Evidence Appendix Tamayo, C4, L45 and C18, Table A) .

The Appellant notes that Baseman, Tamayo and Ranger is the fifteenth consecutive improper patent combination proposed by the Examiner for this or similar subject matter and that these fifteen combinations have each failed to establish a prima facie case of obviousness for a single claim. This is also the fifteenth patent combination in a row where the Examiner has been unable to explain how the different patent teachings should be combined to produce anything useful.

Issue 4 - Whether claims 201, 202, 204, 207, 209 and 211 are patentable under 35 USC 103 over Baseman (U.S. Patent 6,671,673) and Tamayo (U.S. Patent 6,836,773) in view of Ching (U.S. Patent 6,078,901) and claims 205 and 210 are patentable under 35 USC 103 in view of Baseman, Tamayo, Ching and Packwood?

The claims are patentable in view of the shortcomings in the arguments contained in the 3 January 2007 Office Action that were detailed in issue 1 and the usefulness of the results produced by the claimed invention. In particular, claims 201, 202, 204, 205, 207, 209, 210 and 211 are allowable for the first, second, third, fourth and fifth reasons advanced under Issue 1.

A sixth reason that claims 201, 202, 204, 205, 207, 209, 210 and 211 are patentable is that Ching is non-analogous art that teaches away from the cited combination. MPEP 2141.01 states: "*In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned" (In re Oetiker, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445, Fed. Cir. 1992).* The invention of the instant application and the other references are generally related to a commercial enterprise – Baseman focuses on changes to an enterprise supply chain, Tamayo helps support enterprise web site analysis and Packwood displays business risk factors. Ching, on the other hand, describes an infinite spreadsheet "for determining the price of a single commodity and is used to derive the quantitative supply and demand model, which determines the price of multiple commodities which have uniform functionality and, because of competition, necessarily one uniform price" (see page 61, Evidence Appendix Ching, C1, L 45 - 50). It clearly would be improper to combine teachings from three documents that seek to support enterprise management with an invention that determines a price for a single, uniform commodity. Ching also teaches away from a combination with Baseman and Packwood as Ching teaches that risk, like happiness is a non-monetary return (see page 62, Evidence Appendix Ching, C5, L8 – L12). It clearly would be improper to combine inventions designed to analyze the monetary impact of risk with an invention that teaches that risk is a non-monetary factor.

The Appellant notes that the proposed combinations are the sixteenth and seventeenth consecutive improper patent combinations proposed by the Examiner for this or similar subject matter and that these combinations have each failed to establish a prima facie case of obviousness for a single claim. They are also the sixteenth and seventeenth patent combinations in a row where the Examiner has been unable to explain how the teachings of the different patents should be combined to produce anything useful.

Issue 5 - Whether claim 157, claim 158, claim 159, claim 160, claim 161, claim 162, claim 163, claim 164, claim 165, claim 166, claim 167, claim 168, claim 169, claim 170, claim 171, claim 172, claim 173, claim 174, claim 175, claim 176, claim 177, claim 178, claim 179, claim 180 and/or claim 181 are enabled under 35 USC 112, first paragraph?

Claim 157, claim 158, claim 159, claim 160, claim 161, claim 162, claim 163, claim 164, claim 165, claim 166, claim 167, claim 168, claim 169, claim 170, claim 171, claim 172, claim 173, claim

174, claim 175, claim 176, claim 177, claim 178, claim 179, claim 180 and/or claim 181 are patentable for at least four separate reasons:

1. The specification and drawings clearly explain how to make and use the invention described by each of the cited claims;
2. The arguments in the 3 January 2007 fail to establish a prima facie case that would support a written description rejection under 35 USC 112 first paragraph for a single claim;
3. The arguments in the 3 January 2007 Office Action used to support a written description rejection under 35 USC 112 first paragraph fail to comply with the requirements of the Administrative Procedures Act and are therefore moot; and
4. The written description of the instant application is apparently being reviewed under a different standard than that used for the review of similar patent applications, an apparent violation of 35 USC 3.

As noted previously, the first reason claim 157, claim 158, claim 159, claim 160, claim 161, claim 162, claim 163, claim 164, claim 165, claim 166, claim 167, claim 168, claim 169, claim 170, claim 171, claim 172, claim 173, claim 174, claim 175, claim 176, claim 177, claim 178, claim 179, claim 180 and/or claim 181 are patentable is that the specification and drawings enable any person skilled in the relevant arts to make and use the invention defined in the rejected claims. The Appellant believes that the description of the support contained in the "Summary of Claimed Subject Matter" section of this appeal brief makes it clear that the specification and drawings enable each of the rejected claims. The assertion that the claims are enabled by the specification and drawings is also completely supported by the declaration under Rule 132 that has been provided as part of this response (pages 47 - 49, Evidence Appendix).

Since the prima facie case to support the claim rejections has not been established, no rebuttal is required. However, it is worth noting that a declaration under Rule 132 completely rebuts the allegations made regarding alleged written description deficiencies "*...I have concluded that it would be straightforward for someone of average skill in the art to duplicate the automated risk transfer system using the information in U.S. Patent Application 09/688,983 together with the patent applications and patents it cross-references.....*" (see page 47 - 49 , Evidence Appendix).

As mentioned previously, the second reason that claim 157, claim 158, claim 159, claim 160, claim 161, claim 162, claim 163, claim 164, claim 165, claim 166, claim 167, claim 168, claim 169, claim 170, claim 171, claim 172, claim 173, claim 174, claim 175, claim 176, claim 177, claim 178, claim 179, claim 180 and/or claim 181 are patentable is that the Examiner has failed to establish a prima facie case that the specification does meet the enablement requirements of §112 first paragraph. MPEP 2163 states that: *"in rejecting a claim (under §112 first paragraph), the Examiner must set forth express findings of fact regarding the above analysis which support the lack of written description conclusion. These findings should:*

(A) Identify the claim limitation at issue; and

(B) Establish a prima facie case by providing reasons why a person skilled in the art at the time the application was filed would not have recognized that the inventor was in possession of the invention as claimed in view of the disclosure of the application as filed. A general allegation of "unpredictability in the art" is not a sufficient reason to support a rejection for lack of adequate written description."

The 3 January 2007 Office Action fails to establish the prima facie case required to sustain a §112 first paragraph rejection in at least three ways:

1. <u>There is no evidence that a person skilled in the art would have recognized that the inventor</u>

was not in possession of the invention as claimed. As outlined above, establishing a prima facie case that would support a written description rejection requires reasons that a person skilled in relevant art(s) would not have recognized that the inventor was in possession of the invention in view of the disclosure filed with the original application. In an apparent attempt to provide these reasons, the Examiner has asked a series of questions and made a number of general comments regarding the specification for the instant application. As detailed below, these comments and questions are moot because there is substantial evidence that the Examiner lacks the requisite skill in the relevant arts to make meaningful statements in this regard. Evidence that the Examiner lacks the requisite skill in the relevant arts includes:

a) The Examiner has failed on seventeen consecutive occasions to identify a workable combination of patents. Patents are documents that teach those of average skill in the art how to make and practice an invention. Making and practicing an invention includes identifying and implementing workable combinations with other inventions. The Examiner's inability to use patents to identify workable combinations of the teachings they contain provides substantial evidence that he lacks the average level of skill in the art(s);

b) The Examiner has sought to make the claimed invention for enterprise financial risk management obvious by proposing eight different combinations with the Ching reference. Ching teaches that commodity risk, like happiness is a non-monetary return (see page 62, Evidence Appendix Ching, C5, L8 – L12). This teaching and the repeated attempts to use this reference provides further evidence that the Examiner lacks the ability to read and understand patents; and

c) the Examiner has been unable to explain how to complete any of the seventeen combinations of patents he has proposed to support obviousness rejections in spite of the well established requirement that he do so. Patents are documents that teach those of average skill in the art how to make and practice an invention. The well documented inability to use the descriptions provided by the patents he cites to explain the combinations he proposes provides substantial evidence that the Examiner lacks the average level of skill in the relevant art(s);

The Appellant respectfully submits that the above information provides substantial evidence that any comments that the Examiner makes regarding a written description cannot reasonably be given any weight in a review of claim patentability. For similar reasons, the same can also be said of the Supervising Examiner.

2. No claim limitation(s) at issue have been identified. As discussed previously, the Examiner has asked a number of questions regarding the disclosure in the specification. He has also made a number of general statements regarding the specification including: the disclosure is nothing more than generalities as to various risks and assessing and categorizing various risk factors; various factors are combined to optimize risk management without providing systematic means to achieve risk management optimization; the disclosure is short on specifics as to explicitly how certain risk factors are determined; it is unclear from the disclosure how the computer would be programmed, without undue experimentation, to convert text and essay questions and responses into computer data and in order to take into account all of these subjective risk factors, which the calculation process appears to entail; the specification lists numerous factors, but there appears to be so many variables and subjective determinations to be made at each step of the calculation system; (the specification) is short on any specific direction or guidance as to actually gathering the necessary data, inputting the required data and programming a computer to achieve the desired results; there is no indication in the specification of how the composite factors (elements) are used (picked by trial, error and/or

emotion) to evaluate the strength of a specific intellectual property, brand, etc.; there is no indication in the specification of how the elements are combined for evaluation of risks; and (sic) the elements are randomly picked if so they are repeatable.

However, in every case the Examiner has failed to identify the claim limitations at issue so the Appellant is not sure which claims, if any, might be affected by these arbitrary statements and the questions regarding alleged specification deficiencies. As noted below, the specification for the instant application is also clearly superior to the specification of patents issued to large companies for similar applications and the comments only serve to reinforce the statements regarding the absence of the required skill in the art.

3. There is no evidence that any experimentation would be required to produce the claimed results. The Examiner has indicated that the need for conversion of text and essay questions into computer data would cause a need for such experimentation. However, the Appellant is not aware of any claims that rely on the cited conversion. A question is also raised about the repeatability of the risk evaluation process, however there is no evidence to give any weight to this question. Furthermore, the Appellant also notes that the Examiner has completely contradicted the apparent basis for this general allegation (alleged problems with the repeatability of intangible asset modeling) on at least two occasions (see pages 50 - 52 Evidence Appendix). The Appellant notes again that a general allegation of "unpredictability in the art" is not a sufficient reason to support a rejection for a lack of adequate written description.

The Appellant notes that there are still a number of other ways in which the failure to produce a prima facie case that the specification does not meet the requirements of §112 first paragraph can be documented. This portion of the office action also contained a request for examples. The Appellant notes that it is well established that it is irrelevant whether or not the specification contains illustrative examples (see In re Wright, 999 F 2d 1557, 27 USPQ 2d 1510 1513 Fed. Cir.) and that as a result no examples will be provided.

The third reason that that claim 157, claim 158, claim 159, claim 160, claim 161, claim 162, claim 163, claim 164, claim 165, claim 166, claim 167, claim 168, claim 169, claim 170, claim 171, claim 172, claim 173, claim 174, claim 175, claim 176, claim 177, claim 178, claim 179, claim 180 and/or claim 181 are patentable is that the assertions regarding the alleged lack of enablement are not in compliance with the requirements of the Administrative Procedures Act and are therefore moot. *In Dickinson v. Zurko, 119 S. Ct. 1816, 50 USPQ2d 1930 (1999), the Supreme Court held that the appropriate standard of review of PTO findings are the standards set forth in the Administrative Procedure Act ("APA") at 5 U.S.C. 706 (1994).* The APA provides two standards for review – an arbitrary and capricious standard and a substantial evidence standard. The Appellant respectfully submits that the 3 January 2007 Office Action fails to meet both standards. As detailed in the preceding paragraphs, the 3 January 2007 Office Action fails under the substantial evidence standard because vague allegations and a series of questions from an individual and/or organization that has what appears to be a well documented lack skill in the relevant art(s) do not constitute evidence of a written description deficiency. In fact, the questions and remarks provide additional evidence of a lack of requisite skill in the relevant arts on the part of those providing the comments and questions. In short, the 3 January 2007 Office Action fails to provide even a scintilla of evidence to support the allegation that the specification does not meet the requirements of §112 first paragraph for a single claim. The Appellant also respectfully submits that a review of the prosecution history of this application and related application 10/329,172 makes it clear that any reliance on the written description rejections contained in the 3 January 2007 Office Action would also fail under the second standard of the APA – the arbitrary and capricious standard. Under that standard, the reviewing court analyzes whether a rational connection exists between the agency's factfindings and its ultimate action. The reasons the written description rejections contained in the 3 January 2007 Office Action would fail under the arbitrary and capricious

standard is the Examiner has made at least seventeen unsuccessful attempts to identify a proper combination of these patents to render obvious the invention claimed in the instant application and/or inventions for subject matter related to that of the claimed invention. These well documented failures to identify proper combinations using documents that teach those of average skill in the art how to make and practice an invention, make it clear that it would not be rational to rely on the opinion of this Examiner in making a determination regarding the sufficiency of a written description designed to teach those of average skill in the art how to make and practice an invention. Summarizing the above discussion, the agency's factfindings make it clear that the decision to issue written description rejections for these claims also fails under the arbitrary and capricious standard.

As noted previously, the fourth reason claim 157, claim 158, claim 159, claim 160, claim 161, claim 162, claim 163, claim 164, claim 165, claim 166, claim 167, claim 168, claim 169, claim 170, claim 171, claim 172, claim 173, claim 174, claim 175, claim 176, claim 177, claim 178, claim 179, claim 180 and/or claim 181 are patentable is that the written description of the instant application is apparently being reviewed under a different standard than that used for the review of similar patent applications - an apparent violation of 35 USC 3. Two of the major steps contained in the pending claims in the instant application are:

1. Measuring risk, and
2. Selecting the optimal combination of steps that can be taken to manage risk.

It is well known to those of average skill in the art that a risk measurment step generally involves three inter-related activities – the development of a model of the entity being analyzed, the development of scenarios for that entity and a simulation of the entity being analyzed under the different scenarios. The paragraphs below contains a comparison of some of the support for these two steps in the instant application with some of the support for similar steps in Baseman and an issued patent for risk control optimization (6,876,992).

Risk measurement step:

Activity: Entity Model Development

Instant application: Enterprise data are analyzed using the procedure described in FIG. 6A reference numbers 301 - 312, FIG. 6B reference numbers 321- 332, FIG. 6C reference numbers 341 - 353 and line 1, page 50 through line 35, page 78 of the specification as required to develop a model of enterprise value by category of value

U.S. Patent 6,876,992 *The present invention provides exposure benchmark data to assist in quantification of the risks for clients or organizations that have not attempted similar analysis in the past. This is accomplished by the pre-development of risk models according to various business classes and functional segments* (see page 67, Evidence Appendix, C9, L 29 – 41).

Baseman: Baseman relies on a model developed from planning processes associated with supply chain management, extended demand planning, inventory management, procurement planning and/or production planning (see Page 54, Evidence Appendix, C6, L37 – 62). Each planning process is described with one phrase. The Appellant could not find any discussion about how to select the planning process that should be used for model development.

Activity: Scenario Development

Instant application: The item variables, item performance indicators, composite variables and market value factors that are causal factors for stock price movement are identified as described in FIG 6A reference number 209 and line 1, page 59 through line 12, page 60 of the specification. The causal factors for stock price movement are then analyzed to identify

their volatility under normal conditions as described in FIG. 7 reference number 403 and line 12, page 79 through line 11, page 80 of the specification and under extreme conditions as described in FIG. 7 reference number 405 and line 3, page 81 through line 35, page 81 of the specification. The causal factor volatility information is combined with the previously stored generic risk information to develop scenarios for quantifying enterprise risk as described in FIG. 7 reference number 409 and line 1, page 82 through line 35, page 82 of the specification.

U.S. Patent 6,876,992 No discussion.

Baseman: Baseman discusses the use of exchange rate scenarios for a specific kind of profit optimization analysis (see Page 55, Evidence Appendix, C8, L24). Baseman does not describe how to generate a scenario.

Activity: Simulation

Instant application: The scenarios are combined with the previously developed model of enterprise value by category of value as required to simulate enterprise financial performance as described in FIG. 7 reference number 410 and line 1, page 83 through line 2, page 84. In a manner well known to those of average skill in the art, risk by element and category of value are easily calculated by comparing the values identified before the simulations to the values identified after each simulation.

U.S. Patent 6,876,992 No discussion.

Baseman: Baseman discusses simulation in a general way at least 17 times (see Page 55, Evidence Appendix, C8, L40 for an example). Monte Carlo simulation is mentioned once in association with a specific type of profit optimization analysis (see Page 55, Evidence Appendix, C8, L24).

Baseman also discusses the use of risk pricing information to support an opportunity cost optimization analysis (this would eliminate the need for the three activities outlined above). Baseman also discusses the use of Value at Risk techniques (see Page 57, Evidence Appendix, C28, L21 – 25). Baseman also mentions that risk management improves enterprise value by reducing the cost of capital (see Page 54, Evidence Appendix Baseman, C6, L 28 - 32). The Appellant could not find any discussion about how the decision is made as to which of these contradictory teachings regarding risk quantification should be used.

Optimal selection step

Instant application: Value and risk by element and category of value are entered into a linear programming model to complete optimization calculations for value maximization or risk minimization analyses using the previously developed capital availability, risk transfer product and risk management activity information for each scenario as described in FIG. 7. reference number 411 and line 3, page 84 through line 27, page 84 of the specification. The multi criteria optimization that is mentioned in lines 14 - 15 of page 84 of the specification and described in column 68, lines 1 - 12 of cross-referenced U.S. Patent 5,615,109 is used to complete the combined value and risk optimization analysis.

U.S. Patent 6,876,992 The last two steps are the calculation of the EVA for a plurality of risk controls and the identification of the risk control with highest EVA. The specification states that economic value added is equivalent to the EVA measure developed by Stern Stewart (see page 66, Evidence Appendix Sullivan C2, L 5 – 35). The EVA measure developed by Stern Stewart can include over 160 adjustments to the accounting data from which it is derived (see pages 68 and 69, Evidence Appendix). Unfortunately, the specification for U.S. Patent 6,876,992 does not describe any of the 160 + adjustments; does not provide any

instructions about which of the 160+ adjustment should be made under which condition(s); and does not offer any guidance regarding what constitutes a material EVA adjustment.

Baseman: Baseman describes profit maximization with consideration being given to risk using a variety of techniques. In particular the use of linear programming, simulation and mixed integer programming are mentioned (see Page 57, Evidence appendix, Baseman C28, L 21 – 25). The Appellant could not find any discussion about how to select the technique that will be used for optimization.

Summarizing the comparison shown above:

1. The instant application clearly describes how to complete the risk measurement and optimal selection step.
2. The specification for 6,876,992 discusses assistance for risk model development and the pre-development of risk models using some unknown process. It does not describe scenario development and it does not describe simulation. In short, issued patent 6,876,992 does not appear to describe how to complete any of the activities normally associated with risk measurement. Issued patent 6,876,992 also does not appear to describe the optimization step (which has been defined to equal selection of the highest EVA risk control) since it does not provide all the information required to calculate the EVA metric. The lack of complete information about how to calculate the EVA metric creates a great deal of uncertainty about the proper value of EVA even among those with a very advanced level of skill in the art (see pages 68 – 71, Evidence Appendix).
3. Baseman discusses the use of a variety of possible techniques for model development but does not appear to describe the techniques in any detail and does not appear to teach how to select the right technique. Baseman does not describe scenario development and mentions simulation in a general way. In short, Baseman does not appear to describe the activities normally associated with risk measurement. Baseman also discusses a variety of conflicting, alternative techniques for risk quantification but does not appear describe any of them in any detail and does not appear to describe how to select the right technique. Baseman also mentions a variety of techniques that can be used for optimization. Again, Baseman does not appear to describe how to select the right technique.

It is important to note that the Appellant makes the comparison shown above only to illustrate the point that the above referenced application is not being reviewed under the same standard that has been used for the review and allowance of other, similar patent applications. Another noteworthy fact about the comparison is that U.S. Patent 6,876,992 describes a system that provides support to a person completing analyses and making business decisions and that it was classified as an artificial intelligence patent. The instant application learns from the data and uses other artificial intelligence techniques and it was classified as a business method.

Those of average skill in the art will also recognize that the terms “risk measurement” and “optimization” are being used differently in at least two of the disclosures. U.S. Patent 6,876,992 uses risk measurement to describe the reduction in financial performance caused by a single source of variability (ignoring for a moment the apparent problems with the written description outlined in the discussion above). The instant application uses risk measurement to describe the reduction in financial performance experienced by all or part of an enterprise given a plurality of sources of variability. The teachings of U.S. Patent 6,876,992 cannot be used to replicate the risk measurement calculations completed by the instant application because they do not teach or enable a consideration of the “portfolio effect” that is well known to those of average skill in the art (see page 74, Evidence Appendix). In a similar manner, the instant application cannot be used to practice the risk measurement method of U.S. Patent 6,876,992 because it teaches and relies on

the simultaneous analysis of the portfolio of variability sources in order to quantify the risk facing an enterprise.

U.S. Patent 6,876,992 uses the term "optimization" to describe the selection of the risk control with the highest EVA (again, ignoring for a moment the apparent problems with the written description outlined in the discussion above). The instant application uses "optimization" to describe the selection of a set of actions that maximizes or minimizes the value of a financial measure (or measures) for all or part of an enterprise. The teachings of U.S. Patent 6,876,992 cannot be used to replicate the optimization calculations completed by the instant application because they do not describe or enable a consideration of the "portfolio effect" when making a selection of actions. In a similar manner, the instant application cannot be used to practice the claimed optimization method of U.S. Patent 6,876,992 because it does not teach how to calculate EVA and because optimization has been defined as an exercise that considers all the value and variability experienced by all or part of an enterprise – not just a single risk.

Issue 6 – Whether claim 201, claim 202, claim 203, claim 204, claim 205, claim 206, claim 207, claim 208, claim 209, claim 210, claim 211, claim 212 and/or claim 213 are enabled under 35 USC 112, first paragraph?

The claims are patentable in view of the shortcomings in the arguments contained in the 3 January 2007 Office Action that were detailed in issue 5 and the usefulness of the results produced by the claimed inventions. In particular, claim 201, claim 202, claim 203, claim 204, claim 205, claim 206, claim 207, claim 208, claim 209, claim 210, claim 211, claim 212 and/or claim 213 are allowable for the second, third and fourth reasons advanced under Issue 5.

The fourth reason claim 201, claim 202, claim 203, claim 204, claim 205, claim 206, claim 207, claim 208, claim 209, claim 210, claim 211, claim 212 and/or claim 213 are patentable is that the specification and drawings enable any person skilled in the relevant arts to make and use the invention defined in the rejected claims. The Appellant believes that the description of the support contained in the "Summary of Claimed Subject Matter" section of this appeal brief makes it clear that the specification and drawings enable each of the rejected claims. The assertion that claim 201, claim 202, claim 203, claim 204, claim 205, claim 206, claim 207, claim 208, claim 209, claim 210, claim 211, claim 212 and/or claim 213 are enabled by the specification and drawings is completely supported by the declaration under Rule 132 that has been provided as part of this response (pages 47 - 49, Evidence Appendix).

Since the prima facie case to support the claim rejections has not been established, no rebuttal is required. However, it is worth noting that a declaration under Rule 132 completely rebuts the allegations made regarding alleged written description deficiencies "*...I have concluded that it would be straightforward for someone of average skill in the art to duplicate the automated risk transfer system using the information in U.S. Patent Application 09/688,983 together with the patent applications and patents it cross-references.....*" (see pages 47 - 49, Evidence Appendix).

Issue 7 - Whether the invention described in claims 157 - 168 represents patentable subject matter under 35 USC 101?

The claims represent patentable subject matter and are patentable for at least five reasons:

1. Because the Examiner has failed to establish a prima facie case of non-statutory subject matter for the rejected claims;

2. Because arguments supporting the allegations regarding non-statutory subject matter fail to comply with the requirements of the Administrative Procedures Act and are therefore

moot;

3. Because the subject matter eligibility of the instant application is apparently being reviewed under a different standard than that used for the review of similar patents, an apparent violation of 35 USC 3,

4. Because the claimed inventions produce results that are concrete, tangible and useful; and

5. Because the claimed invention transforms transaction data into a specific set of recommendations for optimizing risk management activities and enterprise financial performance.

As mentioned above, the first reason claims 157 – 168 are patentable is that the 3 January 2007 Office Action has failed to establish a prima facie case of non-statutory subject matter for the rejected claims. As noted in Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility "*the examiner bears the initial burden … of presenting a prima facie case of unpatentability." In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).* The Appellant respectfully submits that the Examiner has not provided any evidence to support his assertions and as a result has failed to meet the burden of establishing a prima facie case that the claims are non-statutory. Instead of providing the evidence required to establish a prima facie case of unpatentability, the Examiner simply made a series of general statements and asked a few questions. The general statements and questions used to support the arbitrary and capricious non-statutory subject matter determination include most of the general statements and questions regarding an alleged lack of written description enablement that were discussed under issue 5. The determination of non-statutory subject matter also appears to rely on two unsupported statements:

1. The results (optimizing) in the present application do not produce concrete results, and

2. The results of applicant's invention in arriving at a probable success factor is clearly not the same results found in State Street Bank & Trust Co. V. Signature Financial group.

The two statements, the questions and the general comments amount to innuendoes regarding an alleged lack of utility. *MPEP 2164.07 states "the examiner has the initial burden of challenging an asserted utility. Only after the examiner has provided evidence showing that one of ordinary skill in the art would reasonably doubt the asserted utility does the burden shift to the applicant to provide rebuttal evidence sufficient to convince one of ordinary skill in the art of the invention's asserted utility. In re Brana, 51 F.3d 1560, 1566, 34 USPQ2d 1436, 1441 (Fed. Cir. 1995) (citing In re Bundy, 642 F.2d 430, 433, 209 USPQ 48, 51 (CCPA 1981)).* Given the complete absence of evidence the Appellant respectfully submits that the Examiner has failed to establish the required prima facie cause of non-statutory subject matter for the rejected claims.

As noted previously, the second reason claims 157 – 168 are patentable is that the assertions regarding the alleged non-statutory subject matter are not in compliance with the requirements of the Administrative Procedures Act and are therefore moot. *In Dickinson v. Zurko, 119 S. Ct. 1816, 50 USPQ2d 1930 (1999), the Supreme Court held that the appropriate standard of review of PTO findings of fact are the standards set forth in the Administrative Procedure Act ("APA") at 5 U.S.C. 706 (1994).* The APA provides two standards for review – an arbitrary and capricious standard and a substantial evidence standard. The Appellant respectfully submits that the 3 January 2007 Office Action fails under both standards. As detailed under issue 5, the 3 January 2007 Office Action fails under the substantial evidence standard because vague allegations and a series of

questions from an individual and organization that have a well documented lack of skill in the relevant art(s) do not constitute evidence. As a result, the 3 January 2007 Office Action fails to provide even a scintilla of evidence to support the allegation that the invention describes non-statutory subject matter. The Appellant also respectfully submits that a review of the prosecution history of this application and related applications makes it clear that any reliance on the statutory subject matter rejections contained in the 3 January 2007 Office Action would also fail under the second standard of the APA. The reasons the non-statutory subject matter rejections would fail under the arbitrary and capricious standard are that:

a) There are no factfindings that can be rationally or irrationally connected to the opinion that the results are not concrete;

b) There are no factfindings that can be rationally or irrationally connected to the opinion that the results in arriving at a probable success factor are not the same results (sic) found in State Street Bank & Trust Co. V. Signature Financial group, and

c) The factfindings related to the alleged deficiencies in the written description show that the prior prosecution of this application and related application 10/329,172 has identified a number of patents that contain some of the same words used in the instant application, and that the Examiner has made at least seventeen unsuccessful attempts to identify a proper combination of these patents to render obvious the invention claimed in the instant application and/or inventions related to the subject matter of the claimed invention. These well documented failures to identify workable combinations using documents (patents) that teach those of average skill in the art how to make and practice an invention make it clear that it would not be rational or reasonable to rely on the opinion of this Examiner in making a determination regarding the sufficiency of a written description designed to teach those of average skill in the art how to make and practice an invention.

In short, the factfindings make it clear that the decision to allow this Examiner to issue non-statutory subject matter rejections for these claims also fails under the arbitrary and capricious standard.

As noted previously, the third reason claims 157 – 168 are patentable is that the subject matter eligibility of the instant application is apparently being reviewed under a different standard than that used for the review of similar patents - an apparent violation of 35 USC 3. As discussed previously under issue 5, an issued risk control optimization patent (U.S. Patent 6,876,992) does not appear to fully describe how to quantify risk or the EVA metric it is designed to optimize. This in turn makes it impossible for anyone of average skill in the art to make and/or practice the invention in a concrete manner. By way of contrast, the instant application clearly identifies the specific way in which risk is calculated and the optimal combination of risk reduction activities is identified (see issue 5 discussion related to 35 USC 3). It is important to note that the Appellant only makes the comparison shown above to illustrate the point that the above referenced application is not being reviewed under the same standard for statutory subject matter that has been used for the review and allowance of other, similar patent applications.

Another example of what appears to be the use of different standards for determining subject matter eligibility can be found by comparing the instant application to Baseman. Baseman advocates the use of several of the same algorithms that are specified for use in the instant application in order to develop a supply chain optimization plan. The Examiner has offered an opinion that the optimization in the instant application is not concrete. This in turn raises the question as to why the use of certain optimization methods are judged to be concrete when used by IBM and not concrete when used in the instant application. It is important to note that the Appellant is not stating that Baseman is not valid. The Appellant only makes the comparison shown above to illustrate the point that the above referenced application is not being reviewed

under the same standard for statutory subject matter that has been used for the review and allowance of other, similar patent applications.

The fourth reason claims 157 – 168 are allowable is that the claimed inventions produce results that are concrete, tangible and useful. In particular, the claimed inventions produce results that meet a long felt need for improved capabilities to analyze and manage the elements of value and risks that drive the financial performance of a commercial enterprise.

The fifth reason claims 157 – 168 are allowable is that the claimed invention is an article of manufacture that transforms transaction data into a set of specific recommendations for optimizing risk and/or value. As noted in the *Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility "the Supreme Court noted that one example of a statutory "process" is where the process steps provide a transformation or reduction of an article to a different state or thing (Diehr, 450 U.S. at 183, 209 USPQ at 6)*. In Alappat, the Court held that "*data, transformed by a machine" "to produce a smooth waveform display" "constituted a practical application of an abstract idea." State Street, 149 F.3d at 1373*. In Arrhythmia, the Court held *"the transformation of electrocardiograph signals" "by a machine" "constituted a practical application of an abstract idea." Id.* Likewise, in State Street, the Court held that *"the transformation of data" "by a machine" "into a final share price, constitutes a practical application of a mathematical algorithm." Id.* Thus, while Diehr involved the transformation of a tangible object - curing synthetic rubber - the Court also regards the transformation of intangible subject matter to similarly be eligible, so long as data or signals represent some real world activity. It is the Appellant's understanding that the PTO views this "data transformation" test as an appropriate way to evaluate subject matter eligibility. The Appellant also notes that in addition to passing the data transformation test, the specification and claims define a substantial, specific utility for the claimed invention – improving real world financial performance.

The fourth and fifth reasons taken together make it clear that the claimed invention is an article of manufacture that supports a practical application with substantial, specific utility and is therefore statutory subject matter.

Issue 8 - Whether the invention described in claims 169 - 181 represents patentable subject matter under 35 USC 101?

The claims are patentable in view of the shortcomings in the arguments contained in the 3 January 2007 Office Action that were detailed in issue 7 and the usefulness of the results produced by the claimed inventions. In particular, Claims 169 - 181 are allowable for the first, second and third reasons advanced under Issue 7.

The fourth reason claims 169 - 181 are allowable is that the claimed inventions produce results that are concrete, tangible and useful. In particular, the claimed inventions produce results that meet a long felt need for improved capabilities to analyze and manage the elements of value and risks that drive the financial performance of a commercial enterprise.

The fifth reason claims 169 - 181 are allowable is that the claimed invention is a machine that transforms transaction data into a set of specific recommendations for optimizing risk management and enterprise financial performance. As noted in the *Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility "the Supreme Court noted that one example of a statutory "process" is where the process steps provide a transformation or reduction of an article to a different state or thing (Diehr, 450 U.S. at 183, 209 USPQ at 6)*. In Alappat, the Court held that "*data, transformed by a machine" "to produce a smooth waveform display" "constituted a practical application of an abstract idea." State Street, 149 F.3d at 1373*. In Arrhythmia, the Court held *"the transformation of electrocardiograph signals" "by a machine"*

"constituted a practical application of an abstract idea." Id. Likewise, in State Street, the Court held that *"the transformation of data" "by a machine" "into a final share price, constitutes a practical application of a mathematical algorithm." Id.* Thus, while Diehr involved the transformation of a tangible object - curing synthetic rubber - the Court also regards the transformation of intangible subject matter to similarly be eligible, so long as data or signals represent some real world activity. It is the Appellant's understanding that the PTO views this "data transformation" test as an appropriate way to evaluate subject matter eligibility (In re Comiskey, No. 2006- 1286). The Appellant also notes that in addition to passing the data transformation test, the specification and claims define a specific, substantial utility for the claimed invention – improving real world financial performance.

The fourth and fifth reasons taken together make it clear that the claimed invention is a machine that supports a practical application with substantial, specific utility and is therefore statutory subject matter.

Issue 9 - Whether the invention described in claims 201 - 206 represents patentable subject matter under 35 USC 101?

The claims are patentable in view of the shortcomings in the arguments contained in the 3 January 2007 Office Action that were detailed in issue 7 and the usefulness of the results produced by the claimed inventions. In particular, Claims 201 - 206 are allowable for the first, second and third reasons advanced under Issue 7.

The fourth reason claims 201 - 206 are allowable is that the claimed inventions produce results that are concrete, tangible and useful. In particular, the claimed inventions produce results that meet a long felt need for improved capabilities to analyze and manage the elements of value and risks that drive the financial performance of a commercial enterprise.

The fifth reason claims 201 - 206 are allowable is that the claimed invention is a process that transforms transaction data into a set of values for risks and elements of value that are useful for optimizing risk management and enterprise financial performance. As noted in the *Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility "the Supreme Court noted that one example of a statutory "process" is where the process steps provide a transformation or reduction of an article to a different state or thing (Diehr, 450 U.S. at 183, 209 USPQ at 6)*. In Alappat, the Court held that "*data, transformed by a machine" "to produce a smooth waveform display" "constituted a practical application of an abstract idea." State Street, 149 F.3d at 1373*. In Arrhythmia, the Court held *"the transformation of electrocardiograph signals" "by a machine" "constituted a practical application of an abstract idea." Id.* Likewise, in State Street, the Court held that *"the transformation of data" "by a machine" "into a final share price, constitutes a practical application of a mathematical algorithm." Id.* Thus, while Diehr involved the transformation of a tangible object - curing synthetic rubber - the Court also regards the transformation of intangible subject matter to similarly be eligible, so long as data or signals represent some real world activity. It is the Appellant's understanding that the PTO views this "data transformation" test as an appropriate way to evaluate subject matter eligibility (In re Comiskey, No. 2006- 1286). The Appellant also notes that in addition to passing the data transformation test, the specification and claims define a specific, substantial utility for the claimed invention – creating and using information that enables the management and optimization of real world financial performance.

The fourth and fifth reasons taken together make it clear that the claimed invention is a process that supports a practical application with substantial, specific utility and is therefore statutory subject matter.

Issue 10 - Whether the invention described in claims 207 - 213 represents patentable subject matter under 35 USC 101?

The claims are patentable in view of the shortcomings in the arguments contained in the 3 January 2007 Office Action that were detailed in issue 7 and the usefulness of the results produced by the claimed inventions. In particular, Claims 207 - 213 are allowable for the first, second and third reasons advanced under Issue 7.

The fourth reason claims 207 - 213 are allowable is that the claimed inventions produce results that are concrete, tangible and useful. In particular, the claimed inventions produce results that meet a long felt need for improved capabilities to analyze and manage the elements of value and risks that drive the financial performance of a commercial enterprise.

The fifth reason claims 207 - 213 are allowable is that the claimed invention is a process that transforms transaction data into a set of values for risks and elements of value that are useful for optimizing risk management and enterprise financial performance. As noted in the *Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility "the Supreme Court noted that one example of a statutory "process" is where the process steps provide a transformation or reduction of an article to a different state or thing (Diehr, 450 U.S. at 183, 209 USPQ at 6)*. In Alappat, the Court held that "*data, transformed by a machine" "to produce a smooth waveform display" "constituted a practical application of an abstract idea." State Street, 149 F.3d at 1373*. In Arrhythmia, the Court held *"the transformation of electrocardiograph signals" "by a machine" "constituted a practical application of an abstract idea." Id*. Likewise, in State Street, the Court held that *"the transformation of data" "by a machine" "into a final share price, constitutes a practical application of a mathematical algorithm." Id.* Thus, while Diehr involved the transformation of a tangible object - curing synthetic rubber - the Court also regards the transformation of intangible subject matter to similarly be eligible, so long as data or signals represent some real world activity. It is the Appellant's understanding that the PTO views this "data transformation" test as an appropriate way to evaluate subject matter eligibility. The Appellant also notes that in addition to passing the data transformation test, the specification and claims define a specific, substantial utility for the claimed invention – creating and using information that enables the management and optimization of real world financial performance.

The fourth and fifth reasons taken together make it clear that the claimed invention is a process that supports a practical application with substantial, specific utility and is therefore statutory subject matter.

Issue 11 – Whether pending claim 211 is unpatentable under the statutory double patenting prohibition given pending claim 204?

The claims are patentable because claims 204 and 211 are each dependent claims that limit a different independent claim that has a different scope. MPEP 706.03(k) states in part that: "*court decisions have confirmed applicant's right to restate (i.e., by plural claiming) an invention in a reasonable number of ways. Indeed, a mere difference in scope between claims has been held to be enough.*"

Issue 12 – Other informality considerations

Item 3 on page 8 of the 3 January 2007 Office Action contains claim objections regarding the alleged improper dependent form of two claims. These objections have been obviated by the 1 February 2007 amendment that corrected a typo.

Conclusion

As detailed above, the evidence used to support the art rejections of the pending claims consists of five improper combinations of documents. There is a similar dearth of valid evidence to support the non-art rejections of the pending claims. For these reasons and the extensive reasons listed below, the Appellant respectfully but forcefully contends that each claim is patentable.

The Appellant notes that with respect to the prosecution of the instant application, it appears that the U.S.P.T.O. has not fully complied with the requirements set forth in the APA and 35 USC 3. Among other things, the Appellant specifically notes that:

a) At least some of the claims appear to be misclassified under class 705;

b) There appears to have been repeated violations of MPEP 941.03;

c) The Examiner has to date refused to enter references from a number of information disclosure statements submitted in accordance with the requirements of 37 CFR 1.97;

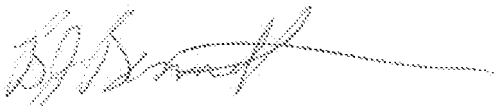
d) There is no evidence that the previously submitted declaration of an expert with a background relevant to the instant application has been considered;

e) The Examiner was allowed to enter rejections under 35 USC 112 first paragraph in spite of what appears to be substantial evidence that the Examiner lacks the average skill in the art required to make meaningful statements in this regard; and

f) The disclosure and statutory subject matter eligibility of the instant application appears to have been reviewed under a different standard than that used for the review and allowance of other applications.

Therefore, reversal of all rejections is courteously solicited.

Respectfully submitted,



B.J. Bennett, President, Asset Trust, Inc.
Dated: April 30, 2007

CLAIMS APPENDIX

157. A computer readable medium having sequences of instructions stored therein, which when executed cause the processor in a computer to perform a risk management optimization method, comprising:

preparing data from a plurality of enterprise transaction systems for use in processing;

measuring a plurality of risks using at least a portion of said data;

identifying one or more risk management activities based upon said risks;

calculating an amount of capital available for said risk management activities using at least a portion of said data; and

determining a combination of risk management activities that optimizes aspects of enterprise financial performance selected from the group consisting of market value, risk and combinations thereof within a constraint of the available capital.

158. The computer readable medium of claim 157, wherein measuring a plurality of risks further comprises quantifying risks under scenarios selected from the group consisting of normal, extreme and combinations thereof.

159. The computer readable medium of claim 157 wherein a market value further comprises one or more categories of value selected from the group consisting of an current operation, real option, market sentiment and combinations thereof.

160. The computer readable medium of claim 157 wherein a risk management activity is selected from the group consisting of establishing one or more risk management control systems, completing one or more risk transfer transactions and combinations thereof.

161. The computer readable medium of claim 160, wherein establishing each of one or more risk management control systems further comprises identifying a risk reduction activity and optionally establishing a method for implementing said activity in an automated fashion.

162. The computer readable medium of claim 160, wherein completing one or more risk transfer transactions further comprises completing activities selected from the group consisting of insurance purchases, derivate transactions, and combinations thereof.

163. The computer readable medium of claim 157, wherein identifying and measuring a plurality of risks further comprises:

developing a computational model of organization market value by category of value, element of

value and external factor by completing a series of multivariate analyses in an automated fashion using at least a portion of the data, and

quantifying a plurality of risks by a category of value using said model, where a category of value is selected from the group consisting of current operation, real option, market sentiment and combinations thereof.

164. The computer readable medium of claim 163 wherein the method further comprises quantifying risk by element of value and external factor where the elements of value are selected from the group consisting of alliances, brands, customers, customer relationships, employees, employee relationships, infrastructure, intellectual property, information technology, partnerships, processes, production equipment, vendors, vendor relationships and combinations thereof.

165. The computer readable medium of claim 157 that further supports an optimization of aspects of financial performance selected from the group consisting of current operation value, real option value, market sentiment value and combinations thereof.

166. The computer readable medium of claim 157 where determining an optimal combination of risk management activities further comprises using a method selected from the group consisting of quasi Monte Carlo, genetic algorithm, multi-criteria optimization and linear programming.

167. The computer readable medium of claim 157 where the method further comprises:

using one or more shadow prices from a linear programming optimization calculation to identify an optimal budget for risk management activities.

168. The computer readable medium of claim 157 where preparing data from a plurality of enterprise transaction systems for use in processing further comprises:

using metadata mapping to convert, integrate and store a plurality of enterprise related data from a plurality of enterprise related systems in accordance with a metadata standard

where a metadata standard is selected from the group consisting of xml and metadata coalition specification and a metadata mapping table is used to support the integration, conversion and storage of data.

169. A risk management optimization system, comprising:

networked computers each with a processor having circuitry to execute instructions; a storage device available to each processor with sequences of instructions stored therein, which when

executed cause the processors to:

prepare data from a plurality of enterprise transaction systems for use in processing;

measure a plurality of risks using at least a portion of said data;

identify one or more risk management activities based upon said risks;

calculate an amount of capital available for said risk management activities using at least a portion of said data; and

determine a combination of risk management activities that optimizes aspects of enterprise financial performance selected from the group consisting of market value, risk and combinations thereof within one or more constraints of the available capital.

170. The system of claim 169, wherein measuring a plurality of risks further comprises quantifying risks under scenarios selected from the group consisting of normal, extreme and combinations thereof.

171. The system of claim 169 wherein a market value further comprises one or more categories of value selected from the group consisting of current operation, real option, market sentiment and combinations thereof.

172. The system of claim 169 wherein a risk management activity is selected from the group consisting of establishing one or more risk management control systems, completing one or more risk transfer transactions and combinations thereof.

173. The system of claim 172, wherein establishing each of one or more risk management control systems further comprises identifying a risk reduction activity and optionally establishing a method for implementing said activity in an automated fashion.

174. The system of claim 172, wherein completing one or more risk transfer transactions further comprises completing activities selected from the group consisting of insurance purchases, derivate transactions, and combinations thereof.

175. The system of claim 169, wherein identifying and measuring a plurality of risks further comprises:

developing a computational model of organization market value by category of value, element of value and external factor by completing a series of multivariate analyses in an automated fashion using composite applications and at least a portion of the data, and

quantifying a plurality of risks by a category of value using said model, where a category of

value is selected from the group consisting of current operation, real option, market sentiment and combinations thereof.

176. The system of claim 175 wherein a series of multivariate analyses are selected from the group consisting of identifying one or more previously unknown item performance indicators, discovering one or more previously unknown value drivers, identifying one or more previously unknown relationships between one or more value drivers, identifying one or more previously unknown relationships between one or more elements of value, quantifying one or more inter-relationships between value drivers, quantifying one or more impacts between elements of value, developing one or more composite variables, developing one or more vectors, developing one or more causal element impact summaries, identifying a best fit combination of predictive model algorithm and element impact summaries for modeling enterprise market value and each of the components of value, building predictive models using transaction data, determining a net element of value impact for each category of value, determining a relative strength of the elements of value between two or more enterprises, developing one or more real option discount rates, calculating one or more real option values, calculating an enterprise market sentiment value by element, developing a covariance matrix, developing a series of scenarios, simulating a financial performance under a given scenario and combinations thereof.

177. The system of claim 169 wherein the method further comprises quantifying risk by element of value and external factor where the elements of value are selected from the group consisting of alliances, brands, customers, customer relationships, employees, employee relationships, infrastructure, intellectual property, information technology, partnerships, processes, production equipment, vendors, vendor relationships and combinations thereof.

178. The system of claim 169 that further supports an optimization of aspects of financial performance selected from the group consisting of current operation value, real option value, market sentiment value and combinations thereof.

179. The system of claim 169 where determining an optimal combination of risk management activities further comprises using a method selected from the group consisting of quasi Monte Carlo, genetic algorithm, multi-criteria optimization and linear programming.

180. The system of claim 169 where the method further comprises:

using one or more shadow prices from a linear programming optimization calculation to identify

an optimal budget for risk management activities.

181. The system of claim 169 where preparing data from a plurality of enterprise transaction systems for use in processing further comprises:

converting and storing a plurality of enterprise related data from a plurality of enterprise related systems in accordance with an xml or metadata coalition metadata standard.

182 – 200. (withdrawn).

201. An advanced management method, comprising:

aggregating and preparing data from a plurality of enterprise related systems for use in processing, and

learning from at least a portion of the data as required to quantify a tangible impact for a plurality of risks and one or more elements of value on one or more subsets of value selected from the group consisting of a category of value, a component of value and combinations thereof

where one or more elements of value are selected from the group consisting of alliances, brands, customers, customer relationships, employees, employee relationships, infrastructure, intellectual property, information technology, partnerships, processes, production equipment, vendors, vendor relationships and combinations thereof, and

where a plurality of risks are selected from the group consisting of event risks, contingent liabilities, volatility and combinations thereof.

202. The method of claim 201 wherein the method further comprises:

identifying one or more risk management activities based upon one or more quantified risks;

calculating an amount of capital available for said risk management activities using at least a portion of said data; and

determining a combination of risk management activities that optimizes aspects of enterprise financial performance selected from the group consisting of market value, risk and combinations thereof within a constraint of the available capital.

203. The method of claim 201 wherein aggregating and preparing data from a plurality of enterprise related systems for use in processing, further comprises using metadata mapping to integrate and store data from said systems in accordance with a common schema.

204. The method of claim 201 wherein a category of value is selected from the group consisting of

current operation, real option, market sentiment and combinations thereof and a component of value is selected from the group consisting of revenue, expense, capital and combinations thereof.

205. The method of claim 201, wherein quantifying a plurality of risks further comprises quantifying risks under scenarios selected from the group consisting of normal, extreme and combinations thereof.

206. The method of claim 208 wherein a risk management activity is selected from the group consisting of establishing one or more risk management control systems, completing one or more risk transfer transactions and combinations thereof.

207. A management analysis method, comprising:

aggregating and preparing data from a plurality of enterprise related systems for use in processing, and

analyzing at least a portion of the data as required to quantify an enterprise value and risk by one or more subsets of value selected from the group consisting of a category of value, a component of value, an element of value and combinations thereof

where an element of value is selected from the group consisting of alliances, brands, customers, customer relationships, employees, employee relationships, infrastructure, intellectual property, information technology, partnerships, processes, production equipment, vendors, vendor relationships and combinations thereof;

where an enterprise value further comprises a market value, and

where an enterprise risk further comprises a sum of a plurality of risks selected from the group consisting of event risks, contingent liabilities, volatility and combinations thereof.

208. The method of claim 207 wherein aggregating and preparing data from a plurality of enterprise related systems for use in processing, further comprises using metadata mapping to integrate, convert and store data from said systems in accordance with a common schema.

209. The method of claim 207 wherein the method further comprises:

identifying one or more risk management activities based upon one or more quantified risks;

calculating an amount of capital available for said risk management activities using at least a portion of said data; and

determining a combination of risk management activities that optimizes aspects of enterprise

financial performance selected from the group consisting of market value, risk and combinations thereof within a constraint of the available capital.

210. The method of claim 207, wherein quantifying an impact for plurality of risks further comprises quantifying an impact for a plurality of risks under scenarios selected from the group consisting of normal, extreme and combinations thereof.

211. The method of claim 207 wherein a category of value is selected from the group consisting of current operation, real option, market sentiment and combinations thereof and a component of value is selected from the group consisting of revenue, expense, capital and combinations thereof.

212. The method of claim 209 wherein a risk management activity is selected from the group consisting of establishing one or more risk management control systems, completing one or more risk transfer transactions and combinations thereof.

213. The method of claim 212, wherein completing one or more risk transfer transactions further comprises completing activities selected from the group consisting of insurance purchases, derivate transactions and combinations thereof.

Evidence Appendix

Pages 47 – 49	declaration under rule 132, received May 5, 2006
Page 50	excerpt from Office Action mailed June 15, 2004
Page 51	excerpt from Donner (6,263,314)
Page 52	excerpt from Office Action mailed July 24, 2006
Pages 53 – 57	excerpt from Baseman (6,671,673)
Pages 58 – 59	excerpt from Tamayo (6,836,773)
Page 60	excerpt from Ranger (6,301,584)
Pages 61 – 62	excerpt from Ching (6,078,901)
Pages 63 – 65	excerpt from Beyond Value at Risk
Pages 66 – 67	excerpt from Sullivan (6,876,982)
Page 68	excerpt from "Measure for Measure"
Pages 69 – 71	excerpt from "EVA and Traditional Accounting Measures"
Pages 72 – 74	excerpt from Integrating Corporate Risk Management

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial No.:	09/688,983	Confirmation No.:	2397
Applicant:	Jeff S. Eder		
Filed:	October 17, 2000		
Examiner:	Harish T. Dass		
Art Unit:	3628		
Docket No.:	AR - 12		
Customer No:	53787		

DECLARATION UNDER RULE 132

I, Rick Rauenzahn, do hereby declare and say:

My home address is 529 Calle don Leandro, Espanola, New Mexico;

I have a B.S. degree in chemical engineering from Lehigh University, an S.M. degree in chemical engineering from The Massachusetts Institute of Technology and a Ph.D. in chemical engineering from The Massachusetts Institute of Technology;

I have worked in the mathematical modeling field for 25 years, concentrating in the disciplines of fluid mechanics, turbulence modeling, numerical methods for partial differential equations, radiation hydrodynamics, and strength of materials. I also have extensive knowledge of computer system administration, particularly for Windows-based, Linux, and Unix systems;

I have been employed by Los Alamos National Laboratory and Molten Metal Technologies for the past 23 years.

I further declare that I do not have any direct affiliation with the application owner, Asset Reliance, Inc. I met the inventor for the first time in April 2006. I will be joining the Technical Advisory Board for Knacta, Inc., a company run by the inventor in May of this year. Knacta, Inc. has a license to the intellectual

property associated with this application.

On April 22, 2006, I was given a copy of U.S. Patent Application 09/688,983 entitled "An automated risk transfer system" filed in the United States Patent Office on October 17, 2000. Until that time I had not read the patent application. I have studied the entire specification in order to closely analyze the claims and drawings. I am totally familiar with the language of the claims and conversant with the scope thereof. I completely understand the invention as claimed.

Based on my experience and training in the field of mathematical modeling and electronic data processing, I have concluded that it would be straightforward for someone of average skill in the art to duplicate the automated risk transfer system using the information in U.S. Patent Application 09/688,983 together with the patent applications and patents it cross-references.

Specifically, U.S. Patent Application 09/688,983 together with the patent applications and patents it cross-references fully describes:

1) how to measure a plurality of risks;
2) how to identify one or more risk management activities based upon said risks;
3) how to calculate an amount of capital available for said risk management activities;
4) how optimization analyses are completed;
5) how market value is computed;
6) how to quantifiy risk under scenarios including normal and extreme;
7) how the system learns, and
8) how enterprise value and risk is quantified.

Based on these and other considerations, it is my professional opinion that U.S. Patent Application 09/688,983 together with the patent applications and patents it cross-references would enable one of average skill in the relevant arts to recreate and practice the claimed invention.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be

true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patents issuing thereon.

Signed,

Rick M. Rauenzahn
Date: April 30, 2006

L5; C29 L9-L61]. Ching does not explicitly disclose integrating organization related data using a common xml schema.

However, XML and is well known and used and used with web-pages with dynamic data input. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the disclosure of Ching and organize data using XML to allow dynamically inputting and displaying the data.

Re. Claim 108, Ching discloses calculating the amount of capital available for risk reduction purchases [C11 L15-L30], identifying the optimal mix of risk reduction products and risk reduction activities given the quantified risks and available capital (Optimal Resource Allocation) [C11 L15-L30; C13 L20 to C18 L50], and displaying the optimal mix using a paper document or electronic display [Figure 15-16, 18; C13 L21 to C18 L50; C20 L3-L5; C29 L9-L61].

Re. Claim 109, Ching discloses implementing the optimal mix of risk reduction products and risk reduction activities in an automated fashion (Optimal Resource Allocation and Completely Automated And Self-generating Software System) [C3 L3-L4; C11 L15-L30; C13 L20 to C18 L50].

Claims 92-106 and 122-132 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ching in view of Donner (US 6,263,314).

US006263314B1

(12) **United States Patent**
Donner

(10) **Patent No.: US 6,263,314 B1**
(45) **Date of Patent: *Jul. 17, 2001**

(54) **METHOD OF PERFORMING INTELLECTUAL PROPERTY (IP) AUDIT OPTIONALLY OVER NETWORK ARCHITECTURE**

(76) Inventor: **Irah H. Donner**, 11601 Yeatman Ter., Silver Spring, MD (US) 20902

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **09/518,681**

(22) Filed: **Mar. 3, 2000**

Related U.S. Application Data

(63) Continuation of application No. 08/811,302, filed on Mar. 4, 1997, now Pat. No. 6,154,725, which is a continuation-in-part of application No. 08/161,816, filed on Dec. 6, 1993, now Pat. No. 5,999,907.

(51) **Int. Cl.**[7] **G06F 17/28**
(52) **U.S. Cl.** **705/1**; 705/10
(58) **Field of Search** 705/1, 7, 8, 10, 705/22, 24; 704/9; 707/2, 3, 5, 10, 100–104

(56) **References Cited**

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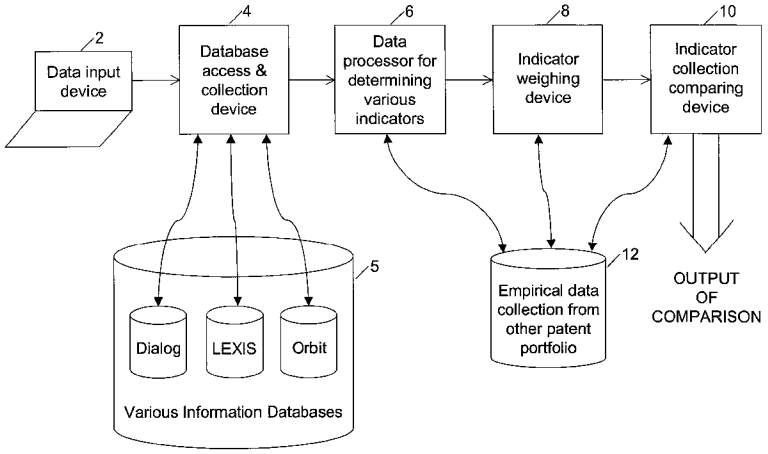
Primary Examiner—Frantzy Poinvil
(74) *Attorney, Agent, or Firm*—Irah H. Donner; Hale and Dorr LLP

(57) **ABSTRACT**

A method of performing an intellectual property (IP) audit estimates a value of an intellectual property portfolio. The method includes the steps of analyzing the IP portfolio, and deriving first information responsive to said analyzing step based upon the IP portfolio. The method also includes the steps of retrieving empirical data relating to known IP portfolios, and comparing the first information to the empirical data producing an IP worth indicator indicating an estimated worth of the IP portfolio. The method is optionally implementable over a network architecture.

27 Claims, 8 Drawing Sheets



intellectual property, partnerships, processes, production equipment, supply chains, vendors, vendor relationships and combinations thereof.

However, King discloses where the quantified risks are identified by an element of value and selected from the group consisting of event risks, continent liabilities, volatility risks and combinations thereof [King - C9 L6-L13; C9 L42-L45; C3 L4-L7; C6 L38 to C7 L6; C19 L12-L28; C26 L33-L57], and where the elements of value are selected from the group consisting of alliances, brands, channels, customers, customer relationships, employees, equipment, intellectual property, partnerships, processes, production equipment, supply chains, vendors, vendor relationships and combinations thereof [King - Abstract; C3 L12-L17; C4 L58 to C5 L21] to transfer a single unique risk of large corporation (entity), and Epstein discloses optionally completing one or more of the identified transactions in an automated fashion [Epstein - Abstract; C1 L31-L42; C2 L37-L48] to immediately accept best investment available at the end of predetermine period. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to combine the disclosure of Garman, King and Epstein to provide automatic quantified risk analyses, transfer and accepting of a unique risk of an entity to avoid losses.

Claims 44 and 85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Garman in view of King and Epstein as applies to claims 42 & 84, further in view of PC-SPAN.

US006671673B1

(12) **United States Patent**
Baseman et al.

(10) **Patent No.: US 6,671,673 B1**
(45) **Date of Patent: Dec. 30, 2003**

(54) **METHOD FOR INTEGRATED SUPPLY CHAIN AND FINANCIAL MANAGEMENT**

(75) Inventors: **Robert Baseman**, Brewster, NY (US); **William Grey**, Millwood, NY (US)

(73) Assignee: **International Business Machines Corporation**, Armonk, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/534,715**

(22) Filed: **Mar. 24, 2000**

(51) **Int. Cl.**[7] **G06F 17/60**

(52) **U.S. Cl.** **705/7**

(58) **Field of Search** 705/1, 7, 10, 35, 705/36

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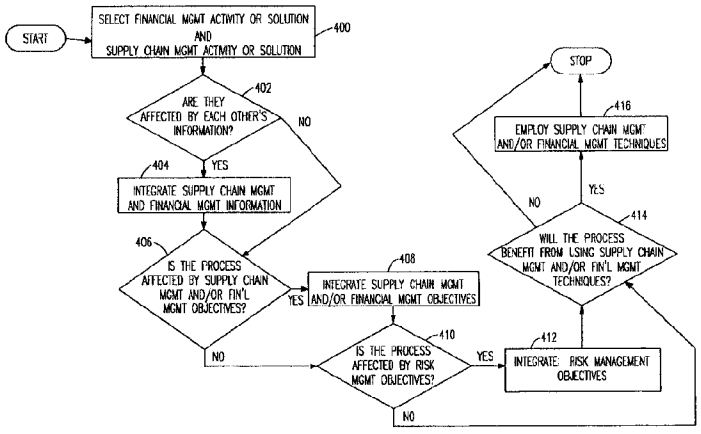
Primary Examiner—Tariq R. Hafiz
Assistant Examiner—Susanna Meinecke-Díaz
(74) *Attorney, Agent, or Firm*—Whitham, Curtis & Christofferson, P.C.; Stephen C. Kaufman

(57) **ABSTRACT**

A method to generate a strategic business plan to improve operations, and to closely monitor various performance measures of an enterprise. This is accomplished employing a more comprehensive approach to maximizing profitability, increasing revenue, and explicitly considering risk. In particular, the method extends supply chain management using financial management considerations, extends financial management using supply chain management considerations, employs supply chain management techniques to improve financial management, and employs financial management techniques to improve supply chain management. The method uses information and models derived from at least one of the following business processes: accounting; cash management; funds management, financing, profitability analysis, risk management, loan management, treasury management, investments management, business development, order management, demand planning and forecasting, procurement, production planning, inventory management, transportation and distribution, and supply chain design.

4 Claims, 4 Drawing Sheets



Issues of ownership structure, fees, royalties etc. are addressed in an early paper by David P. Rutenberg, "Maneuvering liquid assets in a multi-national company: formulation and deterministic solution procedures," *Management Science*, Vol. 16, No. 10, pp. 671–684 (June 1970). This paper represents a partial analysis for tactical planning, since it takes as given the planned operations of each national subsidiary, and hence whether the subsidiary is to be a net source or recipient of funds each year.

Application cases have been reported in P. S. Bender, W. D. Northup and J. F. Shapiro, "Practical Modeling for Resource Management," *Harvard Business Review*, pp. 163–173 (March–April 1981), in the paper industry; in R. L. Breitman and J. M. Lucas, "PLANETS: A Modeling System for Business Planning," *Interfaces*, pp. 94–106 (January–February 1987) for the automobile industry; in Cohen and Lee and in B. C. Arntzen, G. G. Brown, T. P. Harrison and L. L. Trafton, "Global Supply Chain Management at Digital Equipment Corporation," *Interfaces*, pp. 69–93 (January–February 1995) for computer assembly. The model of Arntzen et al. builds on the models of Cohen and Lee (1989) and Huchzermeier (1991) by explicitly considering issues such as duty drawbacks and tariffs. Operational hedging is discussed by Panos Kouvelis in "Global Sourcing Strategies under exchange rate uncertainty". Gordon Gilstrap, "Contribution of Logistics and Supply Chain Management to Shareholder Value," *The Sematech Semiconductor Logistics Forum*, November 1999, indicates that in the future there will be linkages between financial flows and other aspects of the supply chain, but provides no further detail.

More recently, the literature has focused on real options in supply chains. Examples of real options are considered, with option values derived in very simple and stylized settings. Supply chain network options differ from project options, because they exploit synergies derived from global coordination of multiple investments, i.e. network design decisions; and from global coordination of sourcing and distribution logistics, i.e. network material flow decisions. This more realistic context has not been considered by the current literature on valuing non-financial options.

There are a number of limitations to the approaches as described above. In particular, they consider only one exchange rate process, they assume a constant dividend rate, they utilize a cost minimization objective rather than an after-tax profit maximization objective, they consider only a few production switching options, and/or they deal only with a single-period production planning problem.

There are currently no models that effectively integrate SCM and FM. In particular, none of the models effectively considers the tight coupling of the production decision with cash flow movements, royalty fees, dividend repatriation, etc.

SUMMARY OF THE INVENTION

It is therefore an object of the invention to provide a method to assist senior management decision-making, and to closely monitor various performance measures of an entire enterprise. Specifically, the method relates to extending Supply Chain Management (SCM) using Financial Management (FM) considerations, as well as extending FM using SCM considerations. This is accomplished by employing a more comprehensive approach to maximizing profitability, and increasing revenue, and explicitly considering risk.

Broadly speaking, these integration opportunities enhance traditional supply management techniques in two ways:

1. Employing a more comprehensive approach to maximizing profitability, and increasing revenue. This is accomplished by tightly integrating SCM and FM to exploit opportunities created by dynamically responding to changes in market prices, demand, and foreign exchange rates. Several different approaches can be used. Probably the most promising, at least in the near-term, is to identify new ways to maximize profits by incorporating financial considerations into supply chain management decisions. These considerations include the objective of reducing corporate income taxes, personal property taxes, and dividend withholding taxes, as well as improved utilization of financial assets, such as cash "inventories". There are also opportunities to integrate supply chain considerations and techniques into financial management decisions. In particular, by placing greater emphasis on the timing of the receipt of cash inflows, supply chain solutions can improve utilization of financial assets, such as cash and receivables. Finally, the greatest benefits can be gained by simultaneously integrating both supply chain management and financial management.
2. Explicitly considering risk The impact of risk can be assessed in a number of different ways, but probably most important is its affect on funding costs and the firm's cost of capital. The approach seeks to reduce interest expense by exploiting SCM to expand the firm's set of financing opportunities, and by improved decision-making. And it seeks to reduce the firm's cost of capital by reducing sensitivity to a suite of risk factors, including foreign exchange risk, interest rate risk, political risk, catastrophe risk, business risk, counterparty risk, credit risk, and geographic risk.

According to the invention, a strategic business plan is generated to assist decision-making, and to closely monitor various performance measures of an enterprise by extending supply chain management using financial management considerations. The method uses information and models derived from at least one of the following planning processes:

- Supply chain management—designing a supply chain model for a firm utilizing firm-specific information including strategic objectives, a desired level of risk, market position of the firm and industry competitive landscape;
- extended demand planning—determining which customer demands to fulfill, and when to fulfill them, while factoring in demand uncertainty, capacity and time constraints;
- inventory management—developing inventory policies to service stochastic customer demand, using information related to service targets, budgets, stock out probabilities and costs and demand fulfillment rates;
- procurement planning—mitigating foreign exchange risk by considering the firm's global foreign exchange position using vendor selection, thereby reducing foreign exchange exposures; and
- production planning—dynamically shifting production in coordination with procurement planning to locations with weak currencies, thereby reducing production costs.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects, aspects and advantages will be better understood from the following detailed description of a preferred embodiment of the invention with reference to the drawings, in which:

FIG. 1 shows the evolution of Supply Chain solutions in the marketplace; and

FIG. 2 is a flow diagram of the general method for extending Supply Chain Management solutions according to the present invention;

FIG. 3 is a flow diagram of the general method for extending Financial Management solutions according to the present invention; and

FIG. 4 is a flow diagram of the general method for extending both Supply Chain Management and Financial Management solutions according to the present invention.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

Referring again to the drawings, and more particularly to FIG. 1, there is shown the evolution of Supply Chain solutions in the marketplace. Supply chain solutions operate at three levels:

Execution level—Enterprise Resources Planning (ERP);

Planning level—Supply Chain Management (SCM); and

Strategic level—Strategic Enterprise Systems (SES).

The ERP level **10** typically comprises bookkeeping, automating traditional functional activities and data integration. The planning or supply chain management (SCM) level **11** typically comprises sophisticated and "intelligent" decision-support systems for different enterprise functions. The strategic level **12** typically comprises applications to assist senior management decision-making, and to closely monitor various performance measures of the entire enterprise. A complete strategic level system is not currently available in the state of the art.

Extensions to Supply Chain Management Using Financial Management Considerations

Extended Supply Chain Design

Supply chain design involves decisions such as facility location, capacity and production planning, market selection, supplier selection, transportation planning, inventories levels, transaction currencies, pricing policies, outsourcing decisions, and design of ownership structure. Supply chain design is a primary source of competitive advantage, and a major contributor to a firm's cost structure.

Supply chain design must be performed within the context of a firm's strategic objectives, its desired level of risk, its market position, and its industry's competitive landscape. These factors are not all typically considered in today's SCM models. Traditional heuristic-based approaches employed by tax-planners are sub-optimal because they do not use optimization techniques to simultaneously address the primary factors affecting the value and profitability of a firm, and they do not explicitly address the impact of risk.

Traditional SCM solutions take a firm's ownership structure as a given, and attempt to optimize its supply chain by minimizing costs. They typically focus on logistics costs such as transportation costs, duties, and inventory carrying costs, ignoring highly leveraged factors such as taxes. For global and multinational firms, there may be significant tax minimization opportunities by:

- Optimizing ownership structure and transfer pricing methodologies for an existing supply chain with the objective of maximizing profit;
- Optimizing supply chain design for an existing ownership structure, by seeking to maximize profit or value of the firm within the context of considerations such as international taxation, foreign exchange risk management; and
- Simultaneously optimizing supply chain design and ownership structure, with the objective of maximizing profit or the value of the firm.

Supply chain design can also be used to reduce a firm's foreign exchange exposure by matching production locations with customer locations. However, when considering the impact of foreign exchange risk, there is a trade-off between a firm's profitability, and the benefits of reducing risk by creating a supply chain that is "naturally hedged." By using a constrained mathematical model with this trade-off modeled in the objective function, one can create an efficient frontier showing optimal expected profits for a chosen level of risk. All three of these optimizations can be solved as a network design problem, a well-known approach that can be implemented with existing software tools.

An alternative approach is to estimate the loss in profitability associated with designing a supply chain to reduce risk. If this "opportunity cost" is less than the cost of obtaining a similar position with traditional financial risk management techniques, proposed supply chain design changes should be implemented. Finally, Monte Carlo simulation can be used to "stress test" proposed supply chain designs, testing their robustness to different foreign exchange rate scenarios. It can also be used to analyze the impact of foreign exchange movements on the profitability of a given supply chain design, particularly in cases where customer demand is correlated with foreign exchange rates.

More generally, either of these approaches can be used to optimize a firm's supply chain within the context of other forms of risk. An efficient frontier can be created that identifies optimal supply chain designs to maximize profitability or firm value at a given risk level with respect to one or more sources of risk, such as political risk, catastrophe risk, business risk, geographical risk, and/or local market risks. Where risk can be priced in the marketplace, the opportunity cost approach can be used as a benchmark for assessing the best way to manage these types of risk as well. And if risk cannot be priced in the marketplace, the benchmark can still be used as a tool to facilitate decision-making. Simulation can then be used to stress test alternative designs, testing their robustness.

Extended Demand Planning

The demand planning process attempts to determine which customer demands to fulfill (and when) in the face of demand uncertainty, and capacity and time constraints. Traditional criteria affecting this decision include the size and due date of the order, the strategic importance of the customer, the flexibility in the required due date, and penalties and discounts specified in the terms and conditions of the customer contract.

By integrating SCM with FM, demand planning can be used to more effectively optimize profitability by considering a broader range of factors influencing decision-making. For example, a view of the firm's global tax position and its marginal tax rate in different tax jurisdictions permits demand planning to be optimized on an after-tax basis by targeting customers based on their after-tax profitability. Better integration of management accounting information into the demand planning process permits more accurate modeling of production costs, improving the demand planning process when seeking to maximize profit. Historical customer payment patterns can be used to forecast the expected timing of customer payments, thus permitting the time value of money to be considered when assessing the profitability of a delivery to a particular customer. If the company's treasury has a view on expected foreign currency movements, shipments denominated in a depreciating cur-

agreements with its banks. Other objectives would probably include maximizing profit, and meeting strategic requirements such as maintaining good relations with key customers.

Referring again to FIG. **2**, once the FM information has been integrated with the selected activities or solutions, a determination of whether the process is affected by FM objectives is made in decision block **206**. FM activities and solutions frequently have different objectives from SCM activities and solutions. For example, SCM activities and solutions often have objectives such as improving cycle time, increasing customer service, reducing logistics costs, reducing inventory, improving demand forecasts, and improving asset utilization. FM activities and solutions, on the other hand, may have objectives such as reducing risk, reducing funding costs, maximizing the value of the firm, increasing liquidity, and improving financial asset utilization. At this step, it is determined whether the activity or solution is affected by FM objectives. Being affected by FM objectives means that improvements in strategy, tactics, planning or operations would result by broadening the scope of objectives considered in the activity or solution through integration.

If so, one or more FM objectives are integrated to improve the performance of the SCM activity or solution in block **208**. This can be performed in a number of different ways, depending on the nature of the activity or solution, and the objective being integrated. Typical approaches could use techniques such as heuristics, consulting methodologies, simulation, and optimization. Examples of objectives that could be integrated include reducing funding costs, increasing liquidity, reducing foreign exchange risk, or reducing cost of capital.

A determination is then made as to whether the process is affected by risk management objectives in decision block **210**. In this step, risk management objectives are construed rather broadly to include any form of risk that affects the firm. Thus, it could include insurable risks, as well as market risk, business risk, interest rate risk, uninsurable catastrophe risk, weather risk, political risk, liquidity risk credit risk, counterparty risk, etc. Many of these risk factors are already considered as part of the FM objectives discussed above. However, in some cases, there may be additional risk factors that should be included, either because they are not considered explicitly by the FM activitie(s) or solution(s) being integrated, or because they are outside the scope of traditional FM.

If the process is affected by risk management objectives, then one or more risk management objectives are integrated to improve the performance of the activity or solution in block **212**. This can be performed in a number of different ways, depending on the nature of the activity or solution, and the objective being integrated. Typical approaches could use techniques such as heuristics, consulting methodologies, simulation, and optimization. Examples of objectives that could be integrated include mitigation or reduction of risk factors such as market risk, business risk, interest rate risk, uninsurable catastrophe risk, weather risk, political risk, liquidity risk, credit risk, and counterparty risk.

A determination is then made as to whether the process will benefit from using FM techniques, in decision block **214**. FM activities and solutions frequently employ different analysis, management, and decision support techniques than SCM activities and solutions. For example, SCM activities and solutions often employ approaches from the disciplines of Industrial Engineering, Operations Research, and Management Science. FM activities and solutions, on the other hand, often employ solutions from the disciplines of Finance, Economics, Financial Economics, Accounting, Taxation, Law, and Actuarial Science. In this step, it is determined whether the activity or solution will benefit from using FM techniques.

If so, then FM techniques are employed in block **216**. In this step, one or more FM technique(s) are employed to improve the performance of the activity or solution. Different approaches might be used, depending on the nature of the activity or solution, and the technique being employed. Typical approaches could use techniques such as value at risk techniques, option valuation analytics, and portfolio management techniques.

Extensions to Financial Management Using Supply Chain Management Techniques

The section above presented a number of examples of potential opportunities to extend SCM using FM considerations. There are also opportunities to extend financial management using supply chain techniques.

Perhaps the most promising is the application of operations research techniques to supply chain network design, and corporate ownership network design. Traditionally, heuristic approaches have been used to design the ownership structure of a multi-entity multinational firm, with only limited coordination with the firm's supply chain design. By simultaneously optimizing both these networks, profits can be globally optimized, given a set of national corporate tax and withholding tax regimes, a transfer pricing methodology, customer demands, and global supply chain requirements.

There are also a number of opportunities to apply operations research techniques to improve treasury operations. Optimization techniques can be used to improve the scheduling of the timing of cash flows, such as dividend repatriations. Although optimization techniques have been used for cash management and asset liability management, optimizations that link cash management systems with SCM systems will benefit from improved cash forecasts.

Referring now to FIG. **3**, there is shown a flow diagram of the general method for extending FM solutions according to the present invention. If management chooses to plan by extending the FM activity or solution with SCM information, the process begins at block **300**. One or more FM activities or solutions is selected for integration.

A determination is then made as to whether the selected process(es) are affected by SCM information, in decision block **302**. Being affected by SCM information means that improvements in strategy, tactics, planning, or operations would result by broadening the scope of information available through integration. SCM information is information used by, useful for, required by, or available to, SCM activities or solutions.

If the selected process(es) are affected by SCM information, then SCM information is integrated to improve the performance of the FM activity or solution in block **304**. This can be performed in a number of different ways, depending on the nature of the activity or solution, and the information being integrated. Typical approaches could use techniques such as heuristics, consulting methodologies, simulation, and optimization.

Examples of embodiments of this form of integration include:

- Strategic business design considering taxes, transfer pricing, manufacturing and network design;
- Reducing Funding Costs and Cost of Capital (both short and long term) using Vendor selection, sourcing of production, and location decisions Strategic manufac-

Vendor selection (strategic/tactical) considering constraints on dividend repatriation;

Blocked funds in a country addressed by vendor selection, sourcing of production (strategic/tactical), or location decisions;

Customer selection (product allocation) considering credit risk (for all operating divisions, etc.);

Customer selection taking into account foreign exchange risk;

Customer order scheduling taking into account foreign exchange risk;

Customer order scheduling taking into account timing of the cash to cash cycle, and the firm's cash needs; and

Inventory management considering the timing of cash flows.

A determination is then made as to whether the process is affected by SCM and/or FM objectives, in decision block **406**. FM activities and solutions frequently have different objectives from SCM activities and solutions. For example, SCM activities and solutions often have objectives such as improving cycle time, increasing customer service, reducing logistics costs, reducing inventory, improving demand forecasts, and improving asset utilization. FM activities and solutions, on the other hand, may have objectives such as reducing risk, reducing funding costs, maximizing the value of the firm, increasing liquidity, and improving financial asset utilization. Being affected by SCM and/or FM objectives means that improvements in strategy, tactics, planning, or operations would result by broadening the scope of objectives considered in the activity or solution through integration.

If the process is affected by SCM and/or FM objectives, then one or more SCM and/or FM objectives are integrated to improve the performance of the activity or solution in block **408**. This can be performed in a number of different ways, depending on the nature of the activity or solution, and the objective being integrated. Typical approaches could use techniques such as heuristics, consulting methodologies, simulation, and optimization. Examples of objectives that could be integrated include improving cycle time, increasing customer service, reducing logistics costs, reducing inventory, improving demand forecasts, improving asset utilization, reducing funding costs, increasing liquidity, reducing foreign exchange risk or reducing cost of capital.

A determination is then made as to whether the process is affected by risk management objectives, in decision block **410**. In this step, risk management objectives are construed rather broadly to include any form of risk that affects the firm, as described above. Many of these risk factors are already considered as part of the SCM or FM objectives discussed above. However, in some cases, there may be additional risk factors that should be included, either because they are not considered explicitly by the SCM and/or FM activitie(s) or solution(s) being integrated, or because they are outside the scope of traditional SCM and/or FM activities or solutions.

If the process is affected by risk management objectives, then one or more risk management objectives are integrated to improve the performance of the activity or solution, in block **412**. This can be performed in a number of different ways, depending an the nature of the activity or solution, and the objective being integrated. Typical approaches could use techniques such as heuristics, consulting methodologies, simulation, and optimization. Examples of objectives that could be integrated include mitigation or reduction of risk factors such as market risk, business risk, interest rate risk, uninsurable catastrophe risk, weather risk, political risk, liquidity risk, credit risk, and counterparty risk.

A determination is then made as to whether SCM and/or FM techniques should be employed to benefit the process, in decision block **414**. FM activities and solutions frequently employ different analysis, management, and decision support techniques than SCM activities and solutions. For example, SCM activities and solutions often employ approaches from the disciplines of Industrial Engineering, Operations Research, and Management Science. FM activities and solutions, on the other hand, often employ solutions from the disciplines of Finance, Economics, Financial Economics, Accounting, Taxation, Law, and Actuarial Science. In this step, it is determined whether the activity or solution will benefit from using SCM and/or FM techniques.

If SCM and/or FM techniques are to be employed, then one or more SCM and/or FM techniques are employed to improve the performance of the activity or solution, in block **416**. Different approaches might be used, depending on the nature of the activity or solution, and the technique being employed. Typical approaches could use techniques such as linear programming, mixed integer programming, and other optimization and scheduling techniques, value at risk techniques, option valuation analytics, and portfolio management techniques.

While the invention has been described in terms of its preferred embodiment which includes a variety of combinations, those skilled in the art will recognize that the invention can be practiced with modification within the spirit and scope of the appended claims.

Having thus described our invention, what we claim as new and desire to secure by letters patent is as follows:

1. A method to assist decision-making, and to closely monitor various performance measures of an enterprise by extending supply chain management using financial management considerations, said method being performed on a computer and comprising the steps of:

selecting at least one activity or solution related to supply chain management for consideration using a computer resource;

determining whether the selected at least one activity or solution is affected by financial management information, and if so, then integrating the affecting financial information with information related to the selected at least one activity or solution using a computer resource;

developing a process to generate a strategic or operational business plan that provides a solution for the selected at least one activity or solution related to supply chain management using a computer resource;

determining whether the process is affected by financial management objectives, and if so, then integrating the affecting financial management objectives with objectives related to the process using a computer resource;

determining whether the process will benefit from utilizing financial management techniques, and if so, then employing financial management techniques benefitting the process using a computer resource;

selecting the financial management techniques from the group of value at risk techniques, option valuation analytics, and portfolio management techniques using computer resources; and

performing the process using information, objectives, risk management objectives, and techniques associated with the at least one selected activity or solution including information, objectives, risk management

In one aspect of the present invention, the plurality of database tables forms an integrated database comprising collected data in a coherent format. The data mining engine is further operable to: select an algorithm to be used to generate a model; generate at least one model using the selected algorithm and data included in the integrated database; and deploy the at least one model. The deployed model comprises program code implementing the model. The server is operable to generate a prediction or recommendation by scoring a model using data included in the integrated database and generating a predication or recommendation based on the generated score.

In one aspect of the present invention, the system further comprises a data pre-processing engine pre-processing the selected data. The database comprises: a plurality of database tables built from the pre-processed selected data. The plurality of data sources comprises: proprietary account or user-based data; complementary external data; web server data; and web transaction data. The web server data comprises: at least one of: web traffic data obtained by Transmission Control Protocol/Internet Protocol packet sniffing, web traffic data obtained from an application program interface of the web server, and a log file of the web server. The plurality of database tables forms an integrated database comprising collected data in a coherent format. The data mining engine is further operable to: select an algorithm to be used to generate a model; generate at least one model using the selected algorithm and data included in the integrated database; and deploy the at least one model. The deployed model comprises program code implementing the model. The server is operable to generate a prediction or recommendation by scoring a model using data included in the integrated database and generating a predication or recommendation based on the generated score. The data pre-processing engine pre-processes the selected data by performing, on the selected data, at least one of: data cleaning, visitor identification, session reconstruction, classification of web pages into navigation and content pages, path completion, and converting file names to page titles. The data pre-processing engine pre-processes the selected data by collecting pre-defined items of data passed by a web server.

BRIEF DESCRIPTION OF THE DRAWINGS

The details of the present invention, both as to its structure and operation, can best be understood by referring to the accompanying drawings, in which like reference numbers and designations refer to like elements.

FIG. **1** is an exemplary block diagram of a system incorporating the present invention.

FIG. **2** is an exemplary block diagram of a system incorporating the present invention.

FIG. **3** is an exemplary block diagram of one embodiment of an enterprise web mining system, according to the present invention.

FIG. **4** is an exemplary block diagram of one embodiment of an enterprise web mining system, according to the present invention.

FIG. **5** is an exemplary block diagram of a data mining server shown in FIG. **3**.

FIG. **6** is an exemplary block diagram of a database management system shown in FIG. **4**.

FIG. **7** is an illustration of the spectrum data used by web, e-commerce, and enterprise businesses.

FIG. **8** is an exemplary diagram showing the flow of information in the present invention.

FIG. **9** is an exemplary block diagram of one embodiment of an enterprise web mining system, according to the present invention.

FIG. **10** is an exemplary block diagram of a methodological and technical framework implemented in the system shown in FIG. **9**.

FIG. **11** is an exemplary flow diagram of a process for enterprise web mining implemented in the framework shown in FIG. **10**.

FIG. **12** is a data flow diagram of a model generation step shown in FIG. **11**.

FIG. **13** is a data flow diagram of a model scoring step and a prediction/recommendation generation step shown in FIG. **11**.

FIG. **14** is an illustration of the relationship among data, deductive and inductive models.

FIG. **15** is an exemplary format of training tables used in the present invention.

FIG. **16** is an exemplary format of entries in the training tables shown in FIG. **15**.

FIG. **17** illustrates an example of an inductive model generated using a naive Bayes algorithm and/or decision trees.

FIG. **18** illustrates an example of inductive models generated using clustering and association algorithms.

DETAILED DESCRIPTION OF THE INVENTION

The present invention is a technique by which enterprise-wide data mining, especially involving Internet based data sources, may be performed in an automated and cost effective manner. This technique, which includes enterprise-wide data mining involving Internet based data sources, may be termed enterprise web mining. Enterprise web mining involves a plurality of data intensive data sources and repositories with corporate, warehousing and web-transaction components. The methodology and framework of the present invention incorporates these data sources in a way suitable to build data mining inductive models, such as machine learning models, and provides the capability to solve different types of prediction and recommendation problems, along with the spectrum of web and traditional relational database management system functions. Besides prediction and recommendation functions, the present invention also provides the capability to find patterns and important relationships in clickstreams and other web generated data, as well as in traditional databases. The present invention provides improved prediction accuracy, the capability to capture and explain complex behavior, and the capability to make high value predictions and recommendations on a variety of business problems.

Definitions

Web mining—the use of methodologies and data mining algorithms to autonomously review the relationships contained in web data to find patterns that can be used to take actionable business decisions and support personalization and one-to-one business intelligence.

Recommendation—real-time recommendations take into account an individual's preferences and make predictions that allow specific personalized actions possible. Explicit recommendations, can be used for cross-sell or up-sell items. Implicit recommendations can be used for web site content, navigation, and other types of indirect advertising.

Enterprise Web Mining (EWM)—data mining combining a collection of data intensive data sources and repositories with corporate, warehousing and web-transaction components.

appear in a model only if that item has been predefined by the user in advance. In this model, the pre-processing is greatly simplified because the system can collect information and update mining tables without almost any processing. The burden is on the user in terms of predefining the web element of interest and in tracking the user session on-line and passing the major events (clicks on relevant items) to a data collection API. The extra work required from the user can be kept to a minimum if the API recommendation result object is constructed appropriately. For example, one of the attributes of the result object for a recommendation request can be the parameters required for the data collection API call. The advantage of this approach is that the system will work with almost any web server software that supports dynamical web pages (scripts) and will not rely on web analysis packages. The disadvantage is that the user has to provide and collect more information up front and that historical data cannot be readily used by the system. It is also possible to use historical clickstream data if adequate pre-processing of the data is implemented through consulting services.

Data Integration

Data integration, step **1102** of process **1100** involves integrating the different types of data that has been collected to form an integrated database that contains all collected data in a coherent format. One aspect of this is the generation of taxonomies, or systematic classifications, that group attributes in the data tables. This grouping increases the resolution power of the data mining models. Another aspect of data integration is the generation of profiles. For example, there are two main types of visitors to a Web site: unregistered visitors, termed browsers, and registered visitors, termed customers. While a web site has demographic and browsing data available on registered visitors, it only has browsing data on unregistered visitors. As a result, the two types of visitors necessitate different levels of data integration with customer accounts. Unregistered customers can be "profiled" based on their browsing behavior, such as keywords used, length of time, links selected, etc. This behavior can be recorded over multiple sessions and linked to external demographics and form information from similar registered customers. On the other hand, the information from registered customers can be more readily supplemented with external demographics in addition to browsing behavior.

Model Generation

Model generation, step **1106** of process **1100**, involves generating the models that are used to perform online recommendation and prediction. A data flow diagram of a model generation step **1106** is shown in FIG. **12**. A configuration **1202** defines the information, such as items, products, attributes, etc. that are of interest for the user in a particular universe. A schema **1204** defines the types of models that are to be built in specific situations. The configuration **1202** and the schema **1204** are input to model setup step **1106-1**, which sets up the models for training. In particular, model setup step **1106-1** selects the untrained models **1208** that are to be trained. Untrained models **1208** include algorithms **1210**, which process the training data in order to actually build the models. For example, algorithms **1210** may include naïve Bayes algorithm **1212**, classification and regression tree algorithm (CART) **1214**, and association rules **1216**. The algorithms that are to be used to build models are selected by model setup step **1106-1** based on the definitions in schema **1204**. An example of such a schema is shown in Table A:

TABLE A

Type of Data	Number of items	Algorithm
Session (clickstream)	Small (<100)	Naive Bayes, CART and Association Rules
Session (clickstream)	Large (>100)	Naive Bayes and Association Rules
Account	Small or Large	Naive Bayes, CART and Association Rules
Account + Sessions Summary	Small (<100)	Naive Bayes, CART and Association Rules
Account + Sessions Summary	Large (>100)	Naive Bayes and Association Rules
All	Small (<100)	Naive Bayes, CART and Association rules
All	Large (>100)	Naive Bayes and Association rules

In addition, model setup step **1106-1** generates and sets training parameters **1218**. Training parameters **118** are parameters that are input to the algorithms to control how the algorithms build the models. Training data **1220** is data that is input to the algorithms that is used to actually build the models. Training parameters **1218**, untrained models **1208**, including the algorithms **1210** that were selected in model setup step **1106-1**, and training data **1220** are input to training step **1106-2**.

Training step **1106-2** invokes the selected algorithms **1210**, initializes them using the training parameters **1218**, processes training data **1220** the algorithms, and generates trained model **1224**. Trained model **1224** includes representations that implement the logic, conditions, and decisions that make up an operational model. Trained model **1224** is input to evaluation step **1106-3**, which evaluates and refines the model to improve the quality of the model. The refined model is output **1230** to be deployed by step **1106-4**.

In step **1106-4**, the output model **1230** are encoded in the appropriate format and are deployed for use in making predictions or recommendations.

In a preferred embodiment, two levels of model building settings are supported: function and algorithm. When the function level settings do not specify particular algorithm settings, an appropriate algorithm is chosen, providing defaults for the relevant parameters. In general, model building at the function level makes many of the technical details of data mining transparent to the user. Models are built in the data mining server (DMS). After a model is built, it is persisted in the DMS and can be accessed by its user-specified unique name. The typical steps for model building are as follows:

1. Create input data (by associating a mining data object with existing data, for example, a table or file).
2. Create a function settings object.
3. Create a logical data specification and associate it with the function settings.
4. Create a data usage specification and associate it with the function settings.
5. Create algorithm settings (optional).
6. Invoke the build method.

Model testing gives an estimate of model accuracy. You can test classification models, as produced by the Naive Bayes algorithm. After a model is built, model testing computes the accuracy of a model's predictions when the model is applied to a new data set. The test results are stored in a mining test result object. A classification test result includes a confusion matrix that allows a data miner to understand the type and degree of classification errors made

payroll purposes. When an "employee" instance is resolved, the actual class of the instance is one of the two subclass, "exempt" or "nonexempt."

On the other hand, if such an instance is not cached in the data layer **210**, then the instance is instantiated in step **504** with attributes initialized from the seed parameter and the default values in the attribute description, e.g. in the **231-5** field. Instantiation results in the creation of a new entry in the "Instances" table **215** with a unique instance identifier being stored in the "Instance" field **215-1**. In addition, the "Agent Seed" field **215-5** is initialized to the seed parameter and the "Agent State" field **215-4** is cleared.

In step **506**, a "puzzle" is set up that determines which agents are to be invoked for gathering information for the new instance. These agents may be agents specified for the class identified by the class parameter ("class agents") and non-local agents of superclasses of the class ("non-local superclass agents"). In one embodiment, agents are listed in respective entries of the "Agents" table **227**. Class agents are determined from entries in which the class identifier in the "Class" field **227-2** matches the class parameter received in step **500**. Non-local superclass agents are determined from entries in which the "Local" field **227-9** is false and the class identifier in the "Class" field **227-2** matches the class identifier specified in the "Superclass" field **229-1** of the "Is A" table **229** wherein the corresponding "Subclass" field **229-2** contains the class identifier matching the input class parameter.

As described in more detail hereinafter, the puzzle is run, invoking agent to gather data and then integrating the data into one or more entities (step **508**). If successful, the one or more entities are cached in the data layer **210** (step **510**), setting the "Expiration" field **215-3**, as appropriate. For example, the "Expiration" field **215-3** may contain the termination date of a mortal object (cf. the "Life Span" field **225-4**). When a mortal object has expired, it is removed from the data layer **210**. Finally, the instance identifier and the actual class, possibly changed due to a mutation, of the instance is returned in step **512**.

Since agents are invoked when an instance is resolved, information that is potentially more up-to-date can be retrieved than through conventional search engines. Conventional search engines pre-traverse the web to build their index files, which may become out of date for months until the search index is re-updated. With the present invention, however, the "Life Span" attribute controls how long any information object is cached, reducing the obsolescence of information stored at the server to individually acceptable levels, e.g. caching for only a month.

Invoking Agents

Referring to FIG. **6**, running a puzzle results in invoking agents to dynamically access, collect, and integrate "pieces" of data from data sources. More specifically, the agents associated with the class (and superclasses) of the entity to be retrieved are examined. In step **600**, queries are built as a combination of an agent and a "pieece" of information as an input parameter, typically a previously determined attribute for the entity to be retrieved such as a seed value. For example, an agent may get additional information about a person based on a social security number. Given the social security number, a query is created in conjunction with the agent, using the social security number as an input parameter.

On systems that support multi-tasking, all the built queries are launched concurrently at step **602**. Launching a query involves invoking (or executing) an agent with the corresponding piece of information as an input value. The result of launching a query is a result code and, if appropriate, a list of pieces. The result codes are REFRESH_AND_CONTINUE, REFRESH_AND_QUIT, FAIL_AND_CONTINUE, and FAIL_AND_QUIT. "REFRESH" means that the query was successful, while "FAIL" means that the query was unsuccessful (e.g. time out or not found in the data source). "CONTINUE" means that the result is incomplete and "QUIT" means that the query result is controlling, whether successful or unsuccessful. A piece is an attribute, value pair, such as "Name='Bob Smith'".

Generally, agents come in two flavors, attribute agents and content agents, specified in the "Type" field **227-5** of the "Agents" table **227**. An attribute agent is responsible for gathering information about an instance itself, for example, getting the author of a document, the size of the document, and creation date. Attribute agents are normally invoked during instance resolution, which takes place the first time the value of an attribute is requested. In the example, the agent that discovered the length of employment for an employee from an authoritative database is an attribute agent.

Content agents are responsible for gathering the content of the object, for example, getting files in a directory, graphics from a web page, or names from a telephone book. Content agents are invoked whenever content of the object is first accessed, usually when producing a visualization for the object's space. In the example, the agent that discovered files in a directory is a content agent.

To support concurrent query execution, queries use a common "blackboard" to post their results. When a query is launched, the blackboard is first checked for an entry listing the agent and piece. If the entity is incomplete, because another query is currently running, then the query waits until the result from the running query is available and returns the result posted on the blackboard. On the other hand, if there is not entry for the agent and piece, then such an entry in the blackboard is created, the agent is invoked, and the results are posted on to the blackboard and returned.

When an agent is invoked, it is passed an instance identifier for accessing and modifying attributes of the instance being resolved and the input seed value. For example, if the instance is a member of a "employee" class and the seed value is an employee number, the agent is passed an identifier of the instance and the employee number. The agent may use the employee number to query an authoritative database (cf. the "Authoritative" field **227-11**), parse the result to determine some values of attributes (such as length of employment), and initialize the attributes with the parsed values. As another example, a "directory" object may use a pathname as a seed value. The contents, e.g. files and other directories, of a directory having that pathname may be inspected by the agent for creating file objects as contents of the directory object.

At step **604**, the results of launching the queries are processed as they come in. If the query failed to run due to a timeout condition (e.g. with a result code of FAIL_AND_CONTINUE), then the query is placed on a failed queries list. If the query has failed and the agent is considered to be authoritative (result code of FAIL_AND_QUIT), then all remaining agents are marked as done and the search for this puzzle is terminated. If the query has failed, but not due to a time-out (also FAIL_AND_CONTINUE), then the agent is simply marked as done, but the other, concurrently

QUANTITATIVE SUPPLY AND DEMAND MODEL BASED ON INFINITE SPREADSHEET

This application claims the benefit of U.S. provisional Application Ser. No. 60/015,025 filed Apr. 8, 1996, entitled Quantitative Supply and Demand Model Based on Infinitive Spreadsheet.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to computing devices for price determination. The economic law of supply and demand has been quantified in this invention. In particular, this invention deals with a deterministic infinite spreadsheet for calculating the price of a single commodity and a quantitative supply demand model for determining the price of multiple commodities of similar functionality. Also, it deals with the related computing devices and computer software for price and value determination and for rational decision making based on valuation. In a deterministic method, the number of equations equals the number of unknowns, and the deterministic solution is generally non-arbitrary. The quantitative supply and demand model quantifies the qualitative supply and demand model, or the general economic equilibrium analysis, which currently constitutes the foundation of microeconomics.

2. Background of the Invention

Price is still an unsolved problem. It is a problem that has puzzled experts and laymen alike for over five thousand years, or for as long as history can recall. In spite of claims of breakthroughs by past thinkers and modern social scientists, all the current solutions to the problem of price determination cannot produce any deterministic, or non-arbitrary, price in practice. This invention is not just the first correct solution to price determination, but possibly the only usable deterministic method for price determination.

In practice, the solution to price determination in this invention involves a deterministic infinite spreadsheet and a quantitative supply and demand model. Because reality is infinite, the current finite spreadsheet is actually a misrepresentation of reality. A typical example of finite spreadsheet is a good four years economic plan which ignores a possible economic downturn in the fifth year. The infinite spreadsheet is for determining the price of a single commodity and is used to derive the quantitative supply and demand model, which determines the price of multiple commodities which have uniform functionality and, because of competition, necessarily one uniform price.

There is a mutually dependent relationship between the infinite spreadsheet and the quantitative supply and demand model. Conceptually, most of the inputs of the infinite spreadsheet, such as the rent, the interest, etc., are prices themselves. But, these prices are mostly determined through the quantitative supply and demand model. Being averaged quantities, the market determined prices by supply and demand are generally more stable than the price determined by the infinite spreadsheet. Thus, they are suitable as inputs in the infinite spreadsheet.

The accuracy of the inputs and the outputs in price determination needs only to be within a reasonable range. In general, it has been found that while physical science is precise, social science needs only to be quantitative; as long as the values of social and economic factors are expressed in terms of numbers, which do not need to be as precise as those for physical science, reasonable inputs will produce reasonable outputs. The quantitative supply and demand model quantifies the current supply and demand model which is only qualitative.

One of the most important concepts introduced in this invention involves the distinction between empirically verifiable solutions and empirically non-verifiable solutions. Solutions of deterministic systems in physical science involving finite time intervals are examples of verifiable solutions. In fact, physical science deals primarily with verifiable solutions. Price, on the other hand, is an empirically non-verifiable solution. The price in this invention is determined from the relatively time-invariant economic factors affecting the price. When a variable is relatively time-invariant, it is approximately empirically verifiable during the time interval in which it is approximately invariant. In practice, the time-variant price needs to be constantly calculated with changing economic conditions.

A decision, like the price, is also the final resultant after considering all the consequences of the decision. Accordingly, decisions are empirically non-verifiable. Thus, price determination and decision making with their empirically non-verifiable and time-variant nature mark a major departure from our familiar concepts in physical science and signal a distinct extension in the scope of human knowledge.

Identifying the differences between physical science and social science provides an introduction to the background of this invention. The introduction leads logically to a refutation of nearly all the current claims of correct or practical solutions to price; in terms of the progress of human knowledge, the solution to price determination is beyond the current scientific method and outside the understanding of the present social science.

The failure to carry the success achieved in physical science into social science must rank among the major disappointments of the twentieth century. In fact, the rigorous standard of physical science has contributed to the rejection of most solutions in social science. On the other hand, because it is not concerned with value determination, physical science by itself cannot produce definitive value increases, by which social progress should be measured.

This invention shows that the social scientific problem of price determination is not within the domain of problems solvable by the scientific method; the problem is beyond physical science, and is in the field of post-scientific knowledge, or post-science. Post-science deals with the infinite reality with complexity orders of magnitude greater than that of physical science. It tries to solve realistic problems in their entirety rather than to obtain partial solutions in the controlled finite environment as in physical science. Physical science is based mostly on rigorous scientific analysis. All the human faculties, which include perception and imagination, in addition to the analytic ability, are needed in solving the complex problems in post-science. Formulating the problem of price, for example, requires a great deal of perceptive ability.

Reality is conceptually infinite in time and space. Examples of entities, which involve infinite time, are knowledge, materials, real estates, decisions, of which price is an important representative, corporations, everything that affects corporations or businesses, DNA of the living organism, and everything that affects living organisms, particularly human beings. It appears that upon close observation, most things are infinite in nature, and, thus, they are within the domain of post-science. Post-scientific life science even tries to design permanent information systems, such as DNA and non-obsolescent software

based on value judgment, this invention could provide the basis for rational decision making. As a solution to value, it could also be the foundation of social science. Value is defined in this invention as the sum total of all the expected future benefits and losses. Value is the total return, which is the sum of the monetary and the non-monetary returns. The total rate of return can be expected to be roughly constant because the market treats all investments equally. Thus, as a measure of such seemingly non-quantifiable entities as risk, happiness, pride of ownership, etc., non-monetary rate, represented by the difference between the total and the monetary rates of return, can be quantified in this solution to value.

This invention deals primarily with the monetary rate of return, which can be easily calculated from the cash amount of the monetary return. Briefly, the monetary return is derived from the realistic accounting of the expected cash flows and any expected cash from resale of the entity being priced. The cash flows depend on all the factors affecting the price, such as income, expenses, vacancy, rent increases, taxes, transaction costs, finance, etc. This formulation establishes a deterministic relationship between the price and all the factors affecting the price in an expected time space extending from now to the infinite future.

Defining the problem of price determination as the problem of filling up the infinite spreadsheet has the advantage of easily identifying the unknown variables. In the calculation for the monetary return, the unknown variables to be determined are the price and the resale price, which is the future price after a given investment period. To be logically consistent, the same procedure for calculating the price should be applied to the resale price, the resale price of the resale price, and, in fact, all the future resale prices to infinity. Thus, the problem of price determination as described by the infinite spreadsheet has been reduced down to the problem of determining all the resale prices, from which the present price can be readily calculated.

There is a practical problem, which has been often raised and should be resolved in this invention, relating to the inputs of the infinite spreadsheet. Almost all decisions are made based on some future expectations. While it is true that the calculated price will only be as accurate as the accuracy of the expectations of cash flows and resale expenses, it would be only logical to obtain the most reliable expectations, if any expected value is to be used. Reasonable inputs should result in reasonable outputs, provided that the system for relating the inputs to the outputs is rigorously derived. Furthermore, a correct method of price determination will play a crucial role in providing the incentive for making expectations accurate.

Price depends on the future returns. In particular, the present price depends on the future resale prices. Therefore, the logical procedure in the determination of the price is to start from the infinite future and to calculate the succeeding resale prices backward in a time-reversed fashion. The time-reversed procedure of calculating the price is a novelty of this invention and is useful only when there is a first resale price to start the calculation. The determination of this first resale price depends on how the variables in the infinite spreadsheet are defined. Solving for this first resale price, in particular, requires that the expectations can be expressed in a semi-infinite time space.

Taking the future expectations to infinity can be done by borrowing one of the most central concepts in physical science. Physical science and, particularly, the method of empirical verification work because they deal mainly with time-invariant variables. Time-invariant variables are quantities that do not change with time, such as the gravitational constant, the speed of light in vacuum, the Planck's constant, etc. The concept of time-invariant variables can be modified for its application in social science, in general, and price determination, in particular. Only approximate and equivalent time-invariant variables can be identified in social science. Still, it is desirable to define variables in social science in such a way that they are as time-invariant as possible. Expressing the variables in the infinite spreadsheet as approximate time-invariant variables is a necessity because of the involvement of infinity and is one of the novelties of this invention.

The method for creating approximate time-invariant variables in this invention is to express the inputs as dimensionless terms, such as a percentage of price or income. Pegging an input to the price directly, or indirectly through the income or the loan amount, usually helps stabilize the input. In the infinite spreadsheet, all the inputs, except for an initial finite time interval, have to be expressed as equivalent time-invariant variables. One main advantage of approximate time-invariant variables is that they can be easily replaced by equivalent time-invariant variables, which are used to calculate the first future resale price in the infinite spreadsheet.

The price is one of the most famous time variants because of its central economic role, which prevents it from being easily pegged to another term, except itself, in terms of price appreciation. Expressing future resale prices in terms of price appreciation converts the resale prices to dimensionless terms, or approximate time-invariant variable. As hard and as controversial as it is to accept, almost all social decisions are time-variant variables for the same reasons as those for the price. Thus, without a correct solution to value, our decisions and also our societies are irrational. The general application of the concept of time-invariant variables should be further widened because the concept can be used to resolve the historical dilemma of why pre-scientific social science cannot, as physical science can, be used to predict the future precisely. The overwhelming significance of the concept can be demonstrated by a general explanation of the role of our past experiences in predicting future events.

There are two types of experiences. One type can be used to predict the future, and the other type cannot be used to predict the future. Physical science provides us with examples of the type of experiences that can be used to predict the future. Prices, which according to this invention cannot be determined based fully on past experiences, belong to the other type. The main reason that physical science can predict the future is that it deals with experiences which occur and terminate within finite time intervals and, therefore, can be transported from the past to the future in their entirety. Prices, generally involving infinite future, cannot be transported in their entirety because the infinite future never arrives. The only types of experiences, which should be used to predict the future, are those involving time-invariant variables of both physical and social sciences, because they do not change with time. The prediction of the time-invariant price must involve an analytic relationship in an expectation space, such as the infinite spreadsheet.

Unlike physical science, social science generally does not have exact constants of nature or true time-invariant variables. There are many social and economic factors which are suspected to be approximate time-invariant variables of social science. One of the most important approximate time-invariant variables in economics could be the speed of

BEYOND VALUE AT RISK

The new science of risk management

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This book is printed on acid-free paper responsibly manufactured from sustainable forestation, for which at least two trees are planted for each one used for paper production.

- It provides a consistent, integrated treatment of risks across the institution, leading to greater risk transparency and a more consistent treatment of risks across the firm.
- It provides new operational decision rules to guide investment, hedging and trading decisions. These rules take full account of the risk implications of alternative choices and substantially improve the quality of decision-making.
- It provides new remuneration rules for traders, managers and other employees that take account of the risks they take. It therefore helps to discourage the excessive risk-taking that occurs when employees are rewarded on the basis of profits alone, without any reference to the risks they took to get those profits.
- Systems based on VaR methodologies can be used to measure other risks, such as credit, liquidity and cashflow risks, as well as the market risks measured by VaR systems proper. This leads to a more integrated approach to the management of different kinds of risks, and to improved budget planning and better strategic management.
- This new approach enables firms to respond appropriately to regulations, particularly the capital adequacy regulations that financial institutions face. In particular, they tell institutions how to comply with such regulations whilst rearranging their portfolios to minimise the burden that such regulations impose on them.

3.4.5. The VaR Approach to Risk Management: Limitations

Of course, VaR systems have their own problems and limitations, and it is important that users understand these if their firms are to benefit from adopting a VaR approach. Three general limitations especially stand out. One problem is that all VaR systems are backward-looking. They attempt to forecast likely *future* losses using *past* data, based on the assumption, which may or may not be justified, that past relationships will continue to hold in the future. There is therefore always the danger of a major shift – an unexpected collapse of the stock market, say – that inflicts on us losses much bigger than anything a VaR model might have led us to expect. Someone once said that trying to use a VaR system was like trying to drive by looking through the rear-view mirror. The answer to this problem is not to give up on VaR, but to remain aware of this limitation and supplement VaR analyses with scenario analyses that tell us what we might lose under hypothetical circumstances such as a market crash. We need to remember that VaR systems cannot tell us what to expect in these circumstances because they are not designed to.

A second problem stems from the fact that all VaR systems are inevitably based on assumptions that may not be valid in any given circumstances, and our results might accordingly be compromised. The basic answer, again, is to get some feel for our models and our data, and be conscious of where and how our results might be affected. Where possible, we can also check out particular problems by comparing our results with those of other models, and we can sometimes avoid certain problems altogether by upgrading our model (e.g., if we are concerned about returns being non-normal, we can replace a model that assumes returns are normal with one that allows for non-normality). However, the main point is just to be aware of limitations and act accordingly.

Finally, there is the limitation that no VaR system is foolproof. However good the systems are, the fact remains that they are only tools, and they should be used only by people who know how, and how not, to use them. Even a relatively poor VaR system can therefore still be very useful in the hands of experienced operators who know how to use it properly; and even the best VaR system can lead to serious problems in the hands of those

METHOD AND SYSTEM FOR RISK CONTROL OPTIMIZATION

FIELD OF THE INVENTION

The present invention is directed to a method and system of selecting an optimal set of management and risk controls for a given set of risks within a variable control budget. Specifically, optimization according to the present invention is defined using a method and system to calculate the greatest reduction in an organization's risk exposure with the minimum investment in cost and time as measured by the economic value added of the risk system change.

BACKGROUND OF THE INVENTION

Organizations exist for a purpose. They have a vision, goals and specific objectives aimed at achieving the goals and realizing the vision. Risks are those factors that jeopardize the achievement of the organizational objectives, goals, or vision—that create uncertainty that the desire results will be achieved. Organizations must identify risks that put their objectives in jeopardy and deploy controls to reduce the risk exposure.

Risks are created by underlying hazards. Risk is the measure of the uncertainty in both time and severity that a hazard will cause a loss. The proper measure for risk is exposure, which is the product of the probability of the loss and the severity of the loss. Since risk is a stochastic phenomena, the best representation of risk is a loss distribution function showing the probability of various severities of loss.

FIG. **1** shows a sample risk distribution for a single hazard. The total risk is equal to the area under the curve, the sum of all the individual probabilities(Likelihood) times severity(Size of single loss). Risk controls operate to reduce the area under the curve. However, these risk controls have an associated cost. In an ideal world the resources available for risk control are infinite and risks can be reduced to zero. In the real world, resources are limited. The risks can only be reduced to zero by abandoning the objective and a balance must be struck between the "good" to be achieved and the cost of risk controls and potential loss from the residual risk (risk remaining after risk controls are applied).

Furthermore, realization of the organizational vision requires the achievement of numerous objectives, all exposed to a vast number of different risks that need to be managed by a complex array of risk controls. Currently, most organizations manage these risks utilizing disconnected processes that are controlled by different functional areas within the organization. Evaluation by the organization's senior management of the efficiency and effectiveness of these various risk management efforts is hampered by at least two shortcomings.

Management is hampered by the lack of consistent methods for (a) identifying and measuring the risk exposures and (b) measuring the performance of the associated risk controls. This makes it extremely difficult for the organization to set priorities and to achieve an optimal allocation of resources toward risk control across the entire enterprise. This failure to establish an integrated enterprise-wide risk management system exposes an organization to two potentially dire consequences.

First, a major risk may be overlooked that will prevent the achievement of the organization's objectives. Second, resources will be wasted on inefficient and/or ineffective risk control efforts.

One of the necessary and primary objectives of any organization is that economic value be added. The organi-

zation's efforts need to create additional economic value or the organization will eventually exhaust its capital and wither away without having realized its vision. This is true of all organizations whether they be private or public corporations or non-corporate organizations.

One measure of economic performance is Stern Stewart & Co.'s Economic Value Added (EVA™) methodology. The basic theory states that economic value is added when future revenue cash flows exceed the expense and capital cash flows necessary to produce the revenue, more simply stated:

EVA™=Operating Profit (*OP*)−Cost of Capital (*CC*), where Cost of Capital (*CC*)=Capital×Cost of Capital Rate (*C**)

Operating Profit can be further broken into two components:

Operating Profit (*OP*)=Operating Revenue (*OR*)−Operating Expense (*OE*)

So that the Economic Value Added (EVA) becomes:

$$EVA^{TM} = (\text{Operating Revenue} - \text{Operating Expense}) - (\text{Capital} \times C^*)$$
$$= (OR - OE) - (\text{Capital} \times C^*)$$

The aforementioned methodology requires that all of the cash flows should be adjusted for taxes, time and risk. The EVA™ methodology was originally developed as a performance metric for explaining the valuation of public stocks. Stern Stewart & Co. has further expanded its application as a guide for large-scale resource allocation when considering "profit center" investments and as the basis for tying management compensation to increases in shareholder value.

Before an organization can evaluate the performance of risk controls it must first identify and measure the risk exposures. This is a large, complex task, since organizations are faced with a huge number of hazards that generate varying degrees of risk exposure. Organizations generally divide responsibility for various risks among different functional groups within the organization in order to manage these risks.

The basis for the distribution of the responsibility varies from organization to organization and within the same organization. In many instances a functional group will be responsible for managing the risks that jeopardize the operations that they are responsible for. An example is the responsibility of the treasurer for the foreign currency exchange risk. In other instances a manager will have responsibility for risks that span across multiple functional areas where the manager does not have responsibility for the underlying operations. An example is the environmental manager whose is responsible for managing the environmental risks across the entire organization. Frequently responsibility is shared for various portions of the basic risk management process even if the distribution of responsibility is not well defined. FIG. **2** shows a basic risk management process of the related art.

Due to the historical distribution of responsibility for managing risks to isolate functions, the methodologies developed for the identification and measurement of risks vary greatly in their design, assumptions and outputs. Often management of the risks is performed using arcane technical language that varies from one functional area to another. Although the managers of these various risk are generally aware that the risk exposure has a probability and a severity component, they rarely use exposure to measure the risks and even more rarely use loss distribution functions to define the risk exposures.

Normally the manager considers the issues of probability and severity separately. Accordingly, sufficient data to define

Accordingly, to calculate the ΔEVA^{IS} for the expected five year lifetime of the investment we layout the EVA cash flows for each of the five years.

$$\text{Year One } EVA = [\$175{,}000 + \$160{,}000 - \$40{,}000] \times .62 - \$19{,}000$$
$$= \$163{,}900$$

Year Two EVA=$163,900

Year Three EVA=$163,900

Year Four EVA=$163,900

Year Five EVA=$163,900

The net present value of these cash flows using a 9.5% discount rate is $629,328.27.

Therefore, the ΔEVA^{IS}=$629,328.27, and if the stock price earnings ratio is 21, then the Market Value Added (MVA) is $13, 215, 894.

Optimizing the Economic Value Added of Risk Controls

The present invention involves a methodology for selecting a set of risk controls that provides the optimal economic value added for a given control budget. The present invention relies on the following unique combination of features to produce a risk optimization method, system, and software that maximizes the economic value added of each functional segment of an organization:

Risk Identification and Quantification

One aspect of the present invention provides assistance in identifying risks at multiple levels of an organization from an organization-wide analysis to a narrowly focused study of specific functional area such as environmental or treasury risk. The present invention provides exposure benchmark data to assist in quantification of the risks for clients or organizations that have not attempted similar analysis in the past. This is accomplished by the pre-development of risk models according to various business classes and functional segments. For instance, risk models for a variety of safety measures common within the paper manufacturing industry can be created, stored and reapplied across multiple organizations or departments within the same industry group or class.

Management System Support

A management system approach to risk that greatly enhances control effectiveness and reliability is further integrated into the present invention. This enables senior management to develop a proactive strategy designed to facilitate organizational goals, rather than respond in a reactive mode to demands from an outside party such as an insurance company or government agency. The approach is in conformity with the COSO framework and various governmental standards regarding risk management.

Client Customizable

Any of the risk or management models developed or applied in the present invention, must allow client interaction, editing, and customization. This allows a client or manager the ability to define critical "value" parameters and to customize the risk and control model to fit their unique culture and situation. This is especially important as risk/management control models proposed in the present invention may be generic to the industry type or business class. By allowing the client or individual manager to structure their risk management system according to their own prioritized goals and experiences, the present invention will permit risk models that most accurately represent the unique characteristics of each organization or company.

Classification of the Client Market

The risk modeling and risk control optimizing methodology is designed so that it can meet the needs of many different segments of the client market. There are at least four ways of segmenting the client market that are useful for evaluating client demand:

Industry class—the system allows a client/operator to model risks and their associated control sets for different industry classes, such as general manufacturing, healthcare, transportation, telecom, utilities, etc.

Client size/complexity classes—The client market can be further divided based upon market size or revenue. For instance, the client market can be divided into four (or more broadly or narrowly if desired) size/complexity segments, which are roughly categorized by their sales value:

1. Major Risk Management (>$5 billion)
2. Risk Management ($1–5 billion)
3. Middle Market ($0.25–1 billion)
4. Commercial lines (<$0.25 billion)

Client Internal Organizational Customers—the system also allows an operator to structure/modify individual risk models so that they meet the needs of different customer segments within a client's organization. These customer segments might include A Board of Directors, Internal Auditers,ExecutiveManagement,ChiefComplianceOfficers, Various Functional Managers (Risk Managers, Environmental Managers, Safety Managers, Fleet Managers, Property Managers, etc.) or Department Heads.

Country Classification—The country in which the customer is located will have an impact on perceived need and value. Countries such as Canada, Australia, New Zealand, Great Britain have regulatory requirements for corporate governance and risk management that work to highlight the need for better risk identification and a management system approach to risk controls. To a lesser extent in the United States the accounting profession, large stockholders and various legal and regulatory agencies are also highlighting the need for better risk identification and a management system approach to risk controls. Various tax structures may be present according to the country in which an individual company resides or operates that may severely affect the manner in which Economic Value Added can be calculated.

Furthermore, it is assumed that these aforementioned classifications will not be limiting of the possible organization or structure of the methodology or system according to the present invention. For instance, clients may desire that risk controls and management controls be classified by their duration (time it takes to implement a measure, short term versus long term strategies), labor requirements (labor intensive or not), etc. . . . It is therefore possible to further examine the needs of various market segments that are currently recognized by the customer and produce or identify additional needs that exist, but are not currently recognized by the customer.

The customer inherently values solutions that satisfy recognized needs. The present invention provides a useful tool to identify needs that were never even realized by a customer until the Economic Value Added of a decision is adequately explained and accepted.

Optimization of the Economic Value Added

Once accurate risk models and their associated risk and management control strategies have been applied/developed in the foregoing aspects of the present invention, one of the final steps is to determine if the risk model is actually ideal. The risk model approach once optimized for EVA answers the question of whether there is any value to a particular set of control activities using a recognized valuation method-

measurement system would have punished our incentive system so tremendously."

NOBODY EVER GOT FIRED FOR...

Given that so much potentially rides on a performance metric, it's easy to see why companies would opt for the market leader. Many companies have decided that selecting Stern Stewart's EVA is the safe and easy choice, akin to selecting Microsoft software for your PCs.

For Minneapolis-based International Multifoods Corp. CFO and senior vice president of finance Bill Trubeck, choosing Stern Stewart was a matter of "going for the gold." "Bring in the best," Trubeck advises. "It may cost more than people want to spend, but in terms of potential return, I think you're way ahead by bringing in the experts to help you. They get you focused and keep you on track."

But independent observers with no ax to grind insist there's no one metric that's right for all companies in all circumstances. "I'd calculate a variety of measures," recommends Carl Noble Jr., adjunct professor of finance at Northwestern University and chairman and CEO of The Alcar Group Inc., a financial software firm he co-founded with another well- known academic, Alfred Rappaport. (Alcar Group is not affiliated with metrics consultants LEK/Alcar Consulting Group.) Says Noble, "I've seen excellent results from all of these consulting firms."

"The world is full of people beating the drum for EVA, but for almost any company you can't apply a cookie-cutter solution," agrees James Knight, vice president and managing partner of the performance measurement and value management practice at SCA Consulting LLC, in Chicago. "Like people, companies are different. You have to ask yourself what your company is about, what business you are in, what your strategy is, and what you are trying to achieve in both the short term and the long term. Then you customize a performance measure for your company."

THE PROBLEM WITH OIL

It's not that these metrics lack flexibility. Stern Stewart, for instance, allows clients to make more than 160 standard adjustments to its EVA calculation, although in practice companies typically make 5 to 15 adjustments. Still, start tinkering with off-the-shelf metrics to suit your tastes and you may quickly conclude that choosing the right measure has more to do with how much financial legerdemain you wish to perform, and which consultant is best equipped to help you do it, than with which metric is intellectually superior for your application.

If you don't believe that, just look at the debate over whether these new metrics make sense for natural resource companies. These companies must spend vast sums identifying and acquiring inventories whose values can fluctuate wildly because of external economic forces, even as they are contributing nothing to current profits or cash flow. Viewed through the lens of a value metric, such inventories are wasteful.

"The problem with oil, and it's true of both EVA and CFROI," says Knight, "is that there's an incentive to pull your reserves out of the ground along with an embedded incentive to have a minimum amount of reserves-- which is not necessarily the right long-term business decision. You wouldn't want a performance measure that incents you to go out of business."

Stern Stewart vice president Al Ehrbar counters that EVA is entirely appropriate for natural resource companies despite the "special difficulties" involved with accounting for inventories such as crude oil reserves. "That gets exceedingly complicated to do really well, and entails using option pricing theory in valuing reserves," he concedes. "But done correctly, it can be very revealing."

Phillips Petroleum Co., for one, is counting on EVA to shed light on its business. "We looked at quite a few metrics going back several years now, and took a real hard look at HOLT's CFROI, which we thought was a pretty good measure but a little complex," says Donald Wallette Jr., manager of corporate planning and development for the $16 billion integrated oil company. "We also looked at ROCE [return on capital employed], ROGI [return on gross investment], and a couple of others, all of which have their advantages. But EVA is the one that got our attention. More than any other, it seemed to combine the capital invested in the business and the cost of that capital with operating income in one relatively simple measure that was a pretty good reflection of economic performance."

Phillips began implementing EVA in 1995. To discourage its managers from halting drilling operations and simultaneously opening up the taps on the company's oil reserves, the company customized its EVA methodology in a way that credits its exploration and production unit with the value of an oil discovery when its reserves become bookable-- that is, when the company has a development plan for the oil field and the funding to pursue it.

where

ROIC = return on invested capital (NOPAT/IC)
WACC = weighted average cost of capital
IC = invested capital (total average capital).

EVA is positive if ROIC exceeds the cost of financing. In this case, the company has created shareholder value. On the other hand, when EVA is negative, the company has lost value.

The computation of NOPAT can be explained by the following equation:

$$\text{NOPAT} = \text{EBIT} - \text{Tax} \tag{4}$$

where

EBIT = earnings before interest and income tax
Tax = corporate income tax.

Net operating profit after tax (NOPAT) is pre-interest but after-tax corporate earnings. A way to calculate NOPAT is the Earnings Before Interest and Tax (EBIT) minus taxes. The terms Operating Profit (Income) and Operating Earnings are widely used instead of EBIT. In other words, NOPAT is the amount of net profit after tax plus interest expense.

There are as many as 164 items for potential adjustment for NOPAT but only a few adjustments are necessary to provide a good measure of EVA (Prober, 2000). Stewart (1991) recommends that the adjustments to the definition of EVA be made only if (a) the amounts are significant, (b) the adjustments have a material impact on EVA, (c) operating people can readily grasp it, and (d) the required information is easy to track. The number of recommended adjustments has been declining in recent years because backtesting and simulation have shown that most of the proposed adjustments have little or no impact on profits (Young, 1999).

The adjustment items recommended by Johnson (2001) include adding the increase in the LIFO reserves, the increase in the bad debt reserves, the increase in capitalized R&D, other operating income, and subtracting an estimate of taxes owed for the period.

Capital begins with the book value of shareholder's equity. Some adjustments need to be made to convert accounting capital to economic capital (invested capital). Interest-bearing debt is added to capital because the debt represents financing (Johnson, 2001). Deferred income taxes created by increasing deferred tax assets are added because they are never paid off and thus represent permanent capital. Deferred income taxes are defined as a balance sheet account that describes the effect of timing differences between the amount of income taxes that are reported as due for financial reporting purposes, and the amount of income taxes that are actually due and payable to the taxing authorities (Young, 1999). Deferred taxes commonly arise from differences between the amount of depreciation expense

CONCLUSIONS

Motivated by increased use in practice, media interest, and academic interest, this study investigated the relationship between EVA and equity market value in the hospitality industry. The investigator used regression analyses to examine whether EVA was superior to traditional accounting measures.

Some of the literature argues that EVA increases shareholders' wealth (Pettit, 1998; Stern, Stewart, & Chew, 1995; Stewart, 1991, 1994). Other studies show that EVA does not have a significant correlation with MVA and does not dominate traditional performance measures in explaining market value of hospitality firms (Biddle et al., 1997; Chen & Dodd, 2001; Clinton & Chen, 1998; Ray, 2001).

The empirical results of this study do not support the claims that EVA is a better financial tool than traditional accounting measurements in explaining market value. EVA did not significantly outperform traditional accounting measures in tests of relative information content. NOPAT and FCF were more highly correlated with market value rather than was EVA. The findings of this study mirrored the findings of Biddle et al. (1997) and Clinton and Chen (1998) that EVA is not superior to other accounting measures in its association with firm values. The results are consistent with the fact that traditional financial statements, ratios, and traditional performance measures are used to ensure accounting compliance requirements and as a yardstick for investors to compare prospective investments in various hospitality companies.

However, there could be possible reasons why the researcher did not detect a stronger relationship between EVA and market value. First, EVA calculation process requires other adjustments to derive NOPAT and invested capital (IC). Not all recommended adjustments were made to derive NOPAT and invested capital. Even if previous researchers stated that most of the proposed adjustments have little material impact, the scope of adjustment could affect the final value of NOPAT and EVA. In addition, some data were not available to make adjustments during the test period.

Second, the market may have failed to recognize the reporting benefits of EVA through the period the researcher studied. It is clear that stock price is greatly influenced by expectations of the future, and the EVA pertains to the past. As more data become available, future studies will be able to assess whether market participants have come to appreciate EVA.

Third, this research used current realizations of performance measures. So, it did not take into account expectations in the valuation of companies. The market price of a stock incorporates the current level of EVA and the expectation of future EVA growth. To increase the stock price, management must increase the current level of EVA and change the market's expectations of future growth. On the other hand, the estimates of the charge for capital and accounting adjustments may not be the ones that the market is using to value companies. Furthermore, the market may not be recognizing the EVA benefits or even considering EVA in the valuation during the study period.

Because empirical research on the EVA or value-added measurements of hospitality industry is still in its infancy, this study may be useful to both academics

and practitioners in understanding how the market value of hospitality firms was affected by EVA and traditional measurements. An attempt to find appropriate performance measures, which explain market value, is an ongoing effort for hospitality financial managers and investors. This study has presented results that show that EVA is a significant predictor of market value with traditional performance measures, even if EVA turned out not to be superior to traditional accounting measures. Hitherto, no hospitality researcher has extracted and compared the relative differences and incremental value of EVA and traditional accounting performance measures. So even though the results have limited value, the study moves us closer to an explanation of EVA both as a potentially important performance measure and as an important analytical tool for capital budgeting and hotel acquisition analysis. As a way of demonstrating to shareholders the firm's commitment to adding economic value, hospitality companies may soon need to disclose EVA in their annual report.

LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

This study is not free of limitations, which may present some potential subjects for further research. The research is limited in scope for the following reasons. There are many adjustment items to be considered in computation of NOPAT and IC, thus the value of EVA can be contingent upon on the researchers' choice of items included in the calculation. In addition, most of the models showed low explanatory power with low R^2 values. In other words, the selected independent variables accounted for only a small portion of the variance of market values.

Another limitation is the selection of the variables used in this study. The variables used in this research were arbitrarily chosen among those that were used in other research studies and considered important influences upon market value. Some other performance measures such as ROI, ROE, ROS, ROA, and EPS could be used in future studies.

Because the hotel and restaurant companies have different financial structures, future research studies could divide hotel and restaurant companies into independent samples. It would be helpful to analyze and compare EVA efficiency in the lodging and restaurant sectors of the hospitality industry. Therefore more meaningful results could be produced. Future research should be undertaken to discover the other factors that influence stock returns. Another study could focus on the trends in the correlation of EVA and MVA in the hospitality industry.

NOTE

1. Stern Stewart & Company is a New York–based global consulting firm that specializes in measuring internal and external performance through its proprietary EVA® (Economic Value Added) framework.

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Insurance Market Developments

A number of important developments in the insurance markets point to increased interest in IRM. Most of the developments involve product or joint venture announcements: there have only been a few major IRM deals announced. In addition, with top-line growth expected to be quite modest in traditional lines of business (a function of slower economic growth and significant price competition), insurers, reinsurers and brokers are beginning to feel significant expense and cost pressures. These players are all seeking ways to expand revenues and earnings, and the attraction of designing risk transfer and financing programs for previously uninsurable risk classes is powerful. Current market conditions are such that revenue growth is quite difficult without the acquisition of other firms, unless the IRM markets can be developed. Indeed, one of the interesting market developments is that the insurance industry through various IRM-type products may actually be taking risks out of or away from the capital markets.

Combining traditional lines of insurance into multi-line policies is not a new concept. This practice has been in use, especially for commercial lines, for more than 20 years. The development of multi-line and multi-year insurance policies has also been around for awhile. Indeed, most of what is called IRM in the market really refers only to these types of covers. Introducing other risks (mostly financial) into the cover is really quite new and is gradually becoming the standard definition of IRM in the marketplace. At the most extreme is the concept of enterprise-wide risk management, which purports, as the term suggests, to incorporate all risks into a consistent risk management framework. The argument is that by incorporating potentially uncorrelated or negatively correlated risks, the "portfolio effect" will permit companies to manage more efficiently their entire risk profile. Perhaps the ultimate IRM product has recently been introduced into the market. This product, called earnings protection insurance, is being touted as a way to guarantee, almost virtually, smooth earnings. It will be quite interesting to observe the market's acceptance of this product: it certainly is an important development for IRM.

Related Proceedings Appendix

None